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GRAPHICS ADJUSTMENT CONTENTS
(Alphabetical)

FOREWARD

The purpose of this booklet is to provide you with a compact reference for adjustments and diagnostic procedures.

This booklet is to be used in addition to theory of adjustment manuals which should still be used when a detailed explanation of an adjustment is needed.

The adjustments have been divided into frames which are numbered in the proper adjustment sequence. The booklet should be used as follows:

Black numbers indicate proper adjustment sequence and frame identification.

Small red numbers at bottom of frame indicate adjustments out of sequence that are affected and should be checked.

Three vertical lines indicate end of an adjustment sequence.

Technical Assistance . . . . Inside Back Cover

"SELECTRIC" COMPOSER

	Frame	Page
Alignment	25-57	6-10
Backspace	206-221	31-33
Carrier Return	156-176	24-27
Covers & Mounts	326-333	49-50
Cycle Clutch	3-5	3
DKD	352-357	52-53
Escapement	112-141	17-22
Index	231-243	34-36
Interlocks	334-351	50-52
Justification	244-308	36-46
Keyboard	6-24	3-6
Mainspring & Cords	142-147	22
Margin Release	309-313	46-47
Modified Composer	363-365	55
Motor & Drive	1-2	3
Operational Control	148-155	23-24
Paper Feed	314-325	47-49
Press Wire Option	366-368	55
Print	70-97	12-15
Ribbon	98-111	15-17
E. O. R.	369-378	56-57
Shift	58-69	10-11
Spacebar	222-230	33-34
Tabulation	177-205	27-31
Velocity Control		
Automatic	362	54
Manual	358-361	54

MT READER

	Frame	Page
Bias Clutch	19-21	60
Cartridge Interlock	18	60
Cycle Clutch	5-14	58-59
Detent Solenoid	39-43	63
Drive Sleeve	22-24	60-61
Emitter	25	61
Head Alignment	59-60	65-66
Head Cable	72	67
Headslide	52	64
Leader	34-35	62
Motor & Drive	1-4	58
Rewind Shaft	15-17	59-60
Search	44-51	63-64
Search Position	61	66
Sprocket & Tape Chute	29-32	61-62
Station Cover	68-71	67
Station Platform	53-54	64-65
Stepping	26-28	61
Switches	62-67	66-67
Tape Bin	33	62
Tape Support	55-58	65
Torque Limiter	36-38	62-63

PT READER

	Frame	Page
Cycle Clutch	1-8	68
Motor & Drive	9	69
Tape Position	10-12	69
Tape Read	17-18	70
Tape Table	13-16	69-70

TRANSLATOR

	Frame	Page
Assembly, Translator Complete	18-24	73-74
Contacts	25-28	74
Cycle Clutch	1-8	71-72
Frame, Moveable	29-36	75
Frame, Stationary	41-44	76
Motor & Drive	39-40	76
Permutation Unit	11-17	72-73
Printer Position	45-46	77
Seeker Unit	9-10	72
Shift	37-38	76

GRAPHICS DIAGNOSTICS CONTENTS
(Alphabetical)

MT/SC DIAGNOSTIC TAPES

Page

- Diagnostic Tape 9900975
  - Ref. 0, Search Test 121
  - Ref. 1-5, Composer Checkout 121
  - Ref. 6-11, Text 121
  - Ref. 12, Edit Memory Printing 266 121
  - Ref. 13, Edit Memory Non-Printing 267 121

- Diagnostic Tape 9900978
  - Ref. 0, Playback Precon 263 122
  - Ref. 1, Ripple Precon 264 122
  - Ref. 2-5, Reference Codes 123
  - Ref. 6, Merge Text 123
  - Ref. 7, Memory Check Precon 265 123
  - Ref. 8, PSCP 125

- Diagnostic Tape Playout, 9900975
  - Ref. 1, Alignment 130
  - Ref. 2, Cycle Clutch 130
  - Ref. 3, Leading 130
  - Ref. 4, Paper Feed 131
  - Ref. 5, Tabulation 131
  - Ref. 6, Merge 132
  - Ref. 7, General Text 132
  - Ref. 8, 260 Text 133

MT/SC DIAGNOSTIC TAPES (Cont'd.)

Page

  - Ref. 9, 261 Text 134
  - Ref. 10, Tab Table 134
  - Ref. 11, 259 Text 134
  - General Information 121

- MT/SC Manual Entry Diagnostics
  - Byte Transfer/Compare/Bump 120
  - Direct Arithmetic 118
  - General Information 114
  - Immediate Arithmetic 118
  - Incremental Jump 119
  - Input Control Panel – Output Lights 116
  - Jump (–LO, EQ) 117
  - Jump (–LO, –EQ) 117
  - Jump (LO, –EQ) 117
  - Manual Entry Procedure 114
  - Manual Program Step Checks 126
  - Memory Check Program 116
  - Multiplex Output 120
  - Operation 115
  - Program Control 119

- MT/SC Sequential Diagnostics 107

MT/SC–PT DIAGNOSTICS

Page

- Binary Bit Chart 100
- CE Latch Card Layout 100
- MT/SC Code Chart 98
- MT/SC Functions 98
- MT/ST Code Chart 99
- No-Print Escapement Table 100
- Paper Tape Reader Diagnostic Check 103
- Paper Tape TTS Codes 104
- Permutation Bar Location 98
- Precon Storage Information 96
- Program Decode For Clue Chart 105
- PSCP Clue Chart 128
- Program Step Set 95
- Service Aids 124
- Translator Code Chart 97
- Translator Diagnostic Check 101
- X & Y Switch & Driver Check 106

"SELECTRIC" COMPOSER DIAGNOSTICS

Page

- Chopper Block Assembly 4
- Cycle Inspection 1
- Flow Charts
  - Alignment Failure 92
  - Backspace Failure 90
  - Dropping Character 93
  - Escapement Failure 91
  - Justification Failure 89
  - Print Problem 86
  - Tab Failure 88
  - Uneven LH Margin 87
- Font Chart 78
- Font Identification 94
- Functional Test
  - Alignment 78
  - Backspace 79
  - Carrier Return 79
  - Cycle Clutch 80
  - Escapement 80
  - Index 81
  - Interlocks 81
  - Justifier 82
  - Keyboard 84
  - Paper Feed 84
  - Print & Ribbon 84
  - Shift 85
  - Tab 85

BASIC MAINTENANCE: EVERY INSPECTION WILL INCLUDE:

1. **Note operator's comments:**

2. **Clean rubber parts, deflector, cardholder, and exposed metal parts. (Power clean if necessary)**

3. **Lubrication**

   A. NO. 10 OIL
   All places outlined for the 72 "Selectric" should be lubricated on the Composer. In addition to the above, all pivot points, bushings, linkage points, and bearings should be lubricated.

   EXAMPLE:

   1. Escapement system gear teeth
   2. Bias clutch springs
   3. Pitch changer key and shaft slot
   4. Chopper bars and interposers
   5. Justifier tube index mechanism

   B. NO. 23 GREASE; USE ON SLIDING SURFACES SUCH AS:

   1. All cams on print sleeve
   2. Cycle clutch teeth
   3. Platen ratchet teeth
   4. Platen planetary, sun and ring gears

   C. SPECIAL LUBRICATION
   1. The escapement ball bearings are lubricated for life with Anderol L–401D. Under no circumstances should these bearings be lubricated with No. 10 Oil.

4. **Special Carrier Maintenance**

   A. ROTATE AND TILT DETENTS
   B. UPPER BALL SOCKET
   C. TILT RING PIVOT
   D. ROCKER SHAFT
   E. CARRIER SHOE
   F. CHARACTER SELECTION AND TIMING

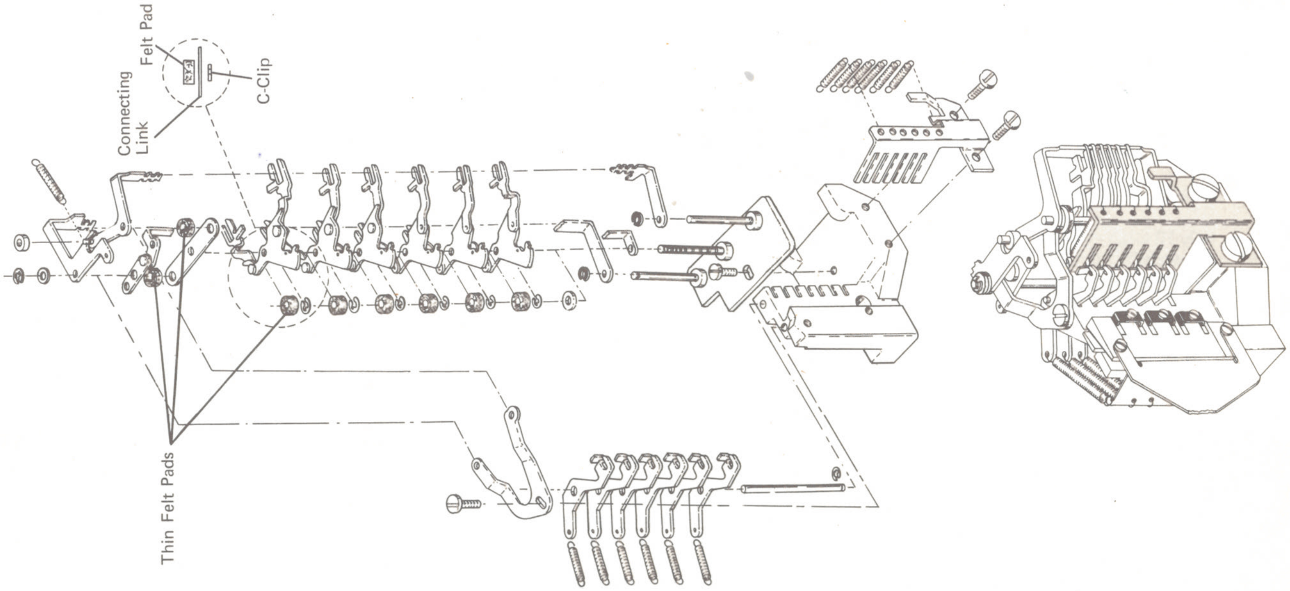
The three periodic inspections will provide the opportunity for a thorough machine inspection program. The following machine functions must be checked annually.

A. Escapement
1. Keyboard selection (character, velocity, and escapement)
2. Set and clear interposer control
3. Timing of filter shaft and six cams on filter shaft
4. Linkage adjustment on chopper bar, escapement and restore bar cam followers
5. Bias spring rewind

B. Justifier
1. Step down of spacebar quantity and value dials
2. Tube indexing and homing
3. Right-hand margin – indicating tube release and restoration
4. Registration and alignment of color bars with window gradient lines.

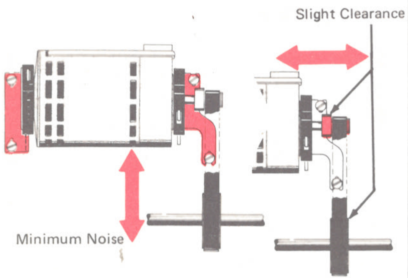
C. Operations
1. Carrier return – lead screw homing and interlocks
2. Tabulation – brake, tab locate and lead screw homing
3. Unit and character backspace – pinwheel overthrow, front latch restore, sensor latch release and interlocks
4. Index – pawl entry, overthrow stop, and selector guide
5. Print velocity control – detenting on medium, low, and no/print selections

CHOPPER BLOCK
(Assembly Drawing)

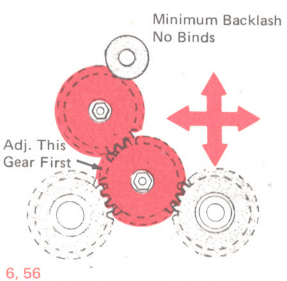


"SELECTRIC" COMPOSER – MOTOR & DRIVE, CYCLE CLUTCH, KEYBOARD

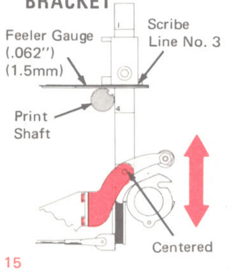
1 MOTOR AND DRIVE BELT



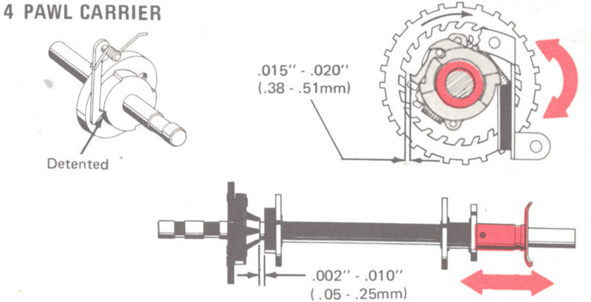
2 IDLER GEARS



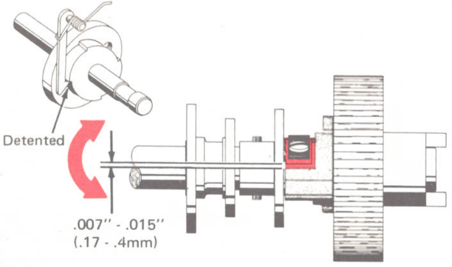
3 CYCLE CLUTCH LATCH BRACKET



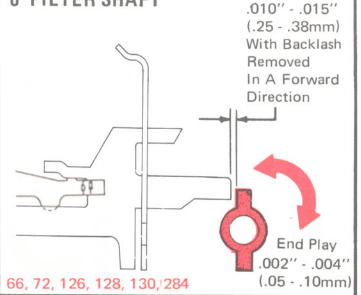
4 PAWL CARRIER



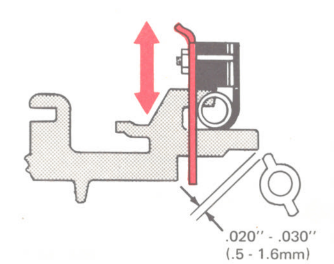
5 CYCLE CLUTCH OVERTHROW



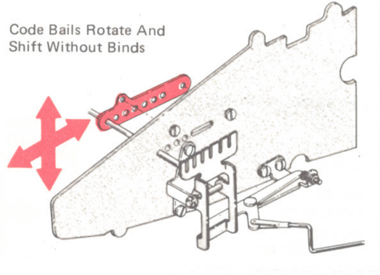
6 FILTER SHAFT



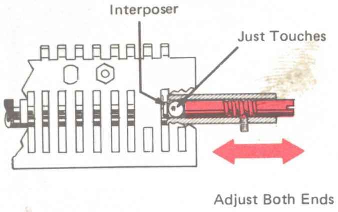
7 REAR INTERPOSER GUIDE COMB



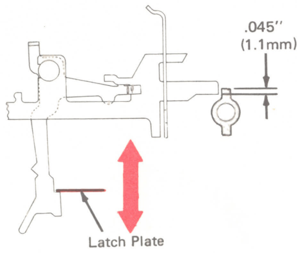
8 CODE BAIL RETAINER PLATE



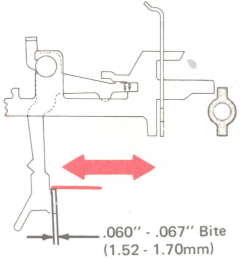
9 SELECTOR COMPENSATOR



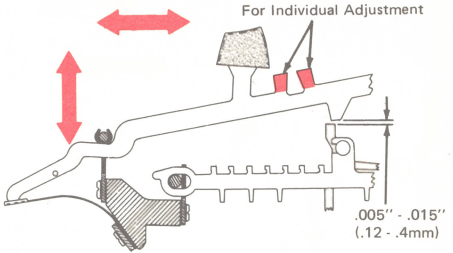
10 LATCH PLATE-HEIGHT



LATCH PLATE – FRONT-TO-REAR

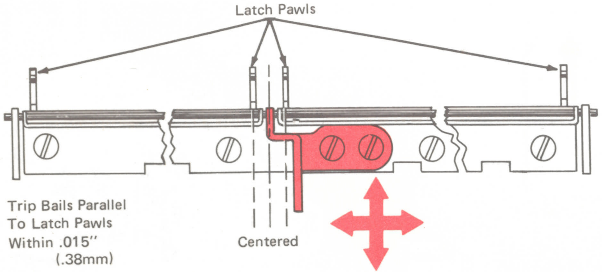


11 FRONT KEYLEVER GUIDE COMB

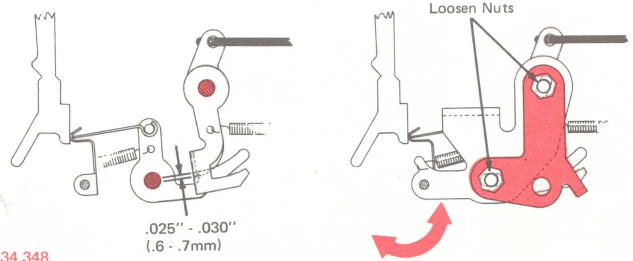


63, 158, 178, 209

12 CONTROL LATCH BRACKET

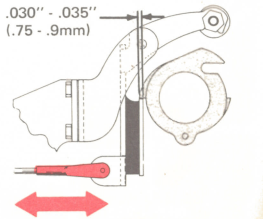


13 CONTROL LATCH BITE

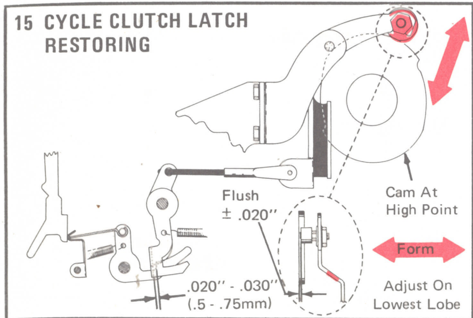


334,348

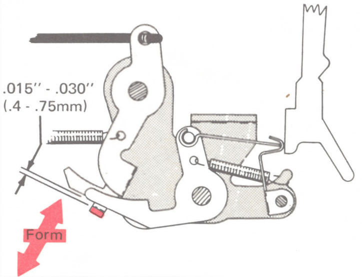
14 CYCLE CLUTCH LATCH LINK



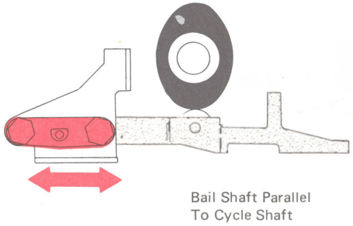
15 CYCLE CLUTCH LATCH RESTORING



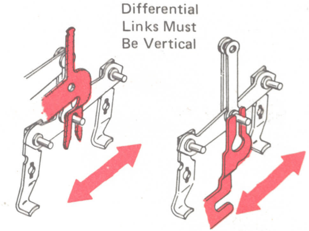
16 CONTROL LATCH OVERTHROW STOP



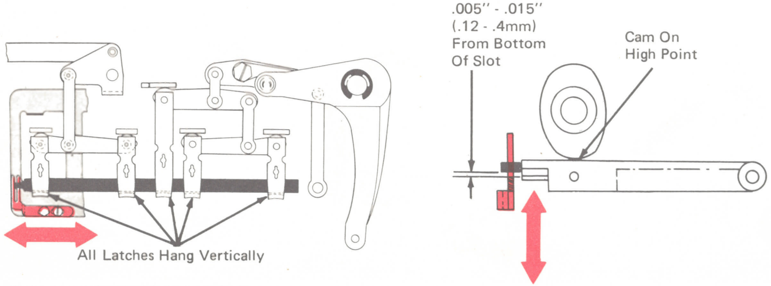
17 LATCH BAIL SHAFT



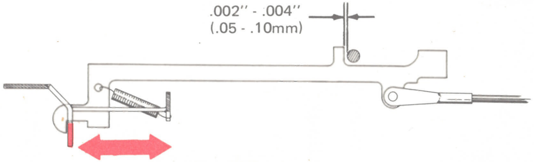
18 DIFFERENTIAL LEVER GUIDES



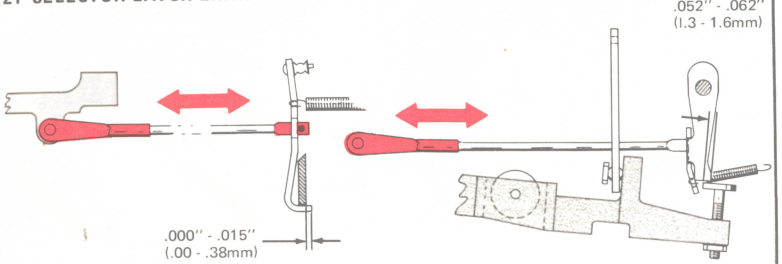
19 LATCH BAIL GUIDE



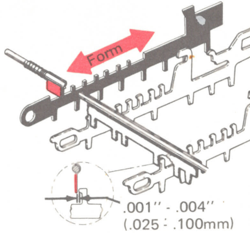
20 LATCH INTERPOSER STOPS



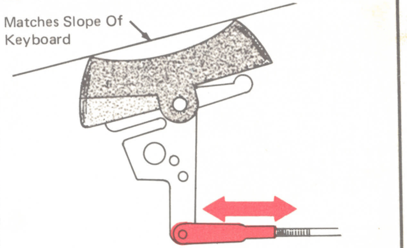
21 SELECTOR LATCH LINKS



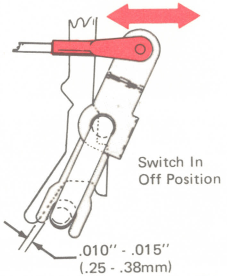
22 CODED BAILS



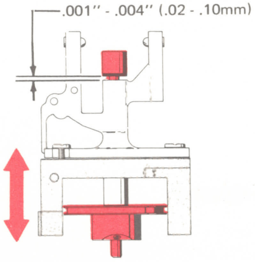
23 SWITCH LINK



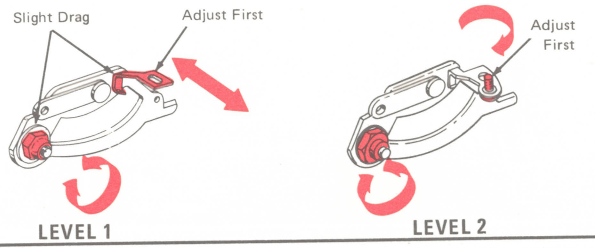
24 LOCKOUT BAIL LINK



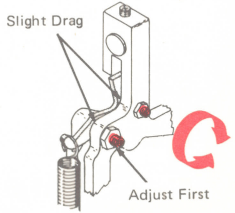
25 ROTATE SHAFT END PLAY



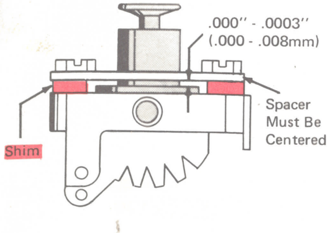
26 ROTATE DETENT



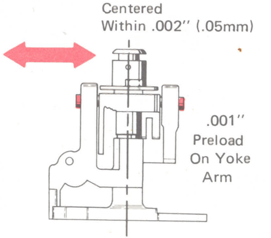
27 TILT DETENT



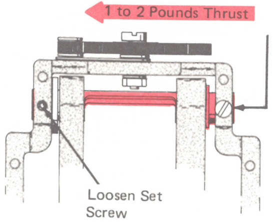
28 UPPER BALL SOCKET



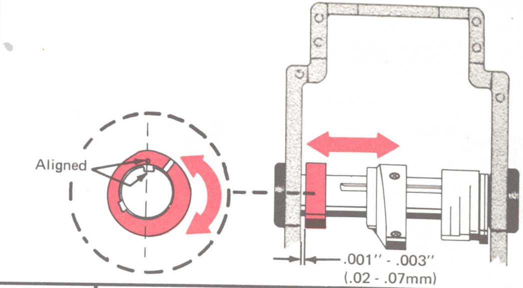
29 TILT RING



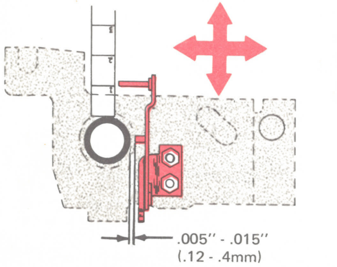
30 ROCKER SHAFT



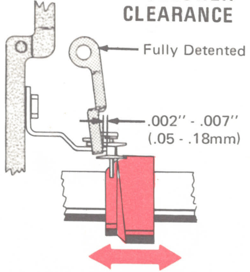
31 PRINT SLEEVE ENDPLAY



32 DETENT CAM FOLLOWER BRACKET

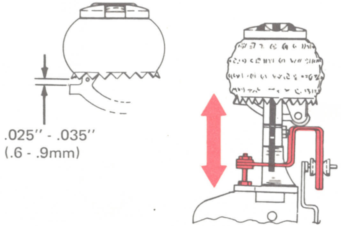


33 DETENT CAM FOLLOWER CLEARANCE



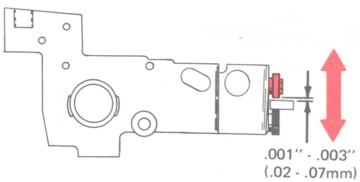
34

34 DETENT SKIRT CLEARANCE

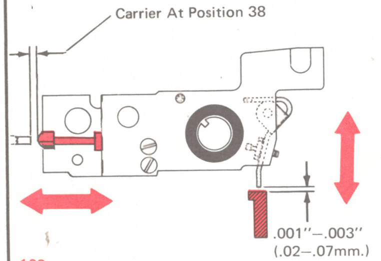


33

35 REAR CARRIER SHOE

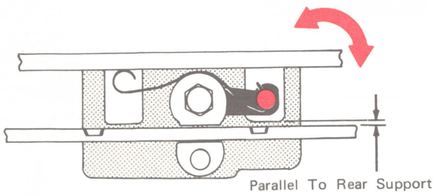


36 CARRIER SUPPORT

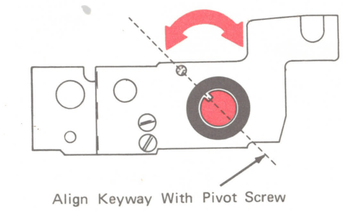


108

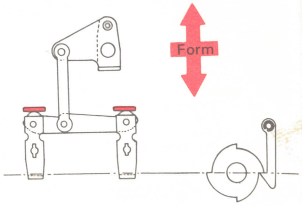
37 REAR CARRIER SHOE TENSION



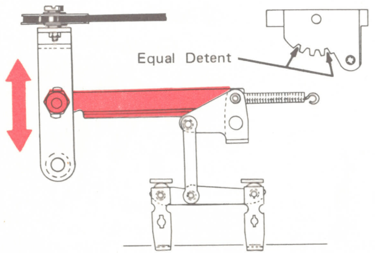
38 PRELIMINARY PRINT SHAFT TIMING



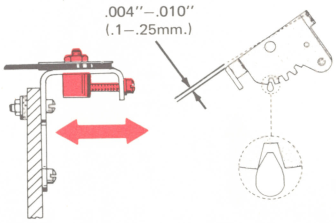
39 TILT SELECTOR LATCHES



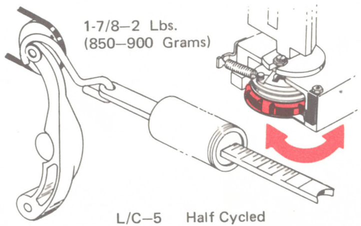
40 TILT ARM MOTION



41 TILT RING HOMING



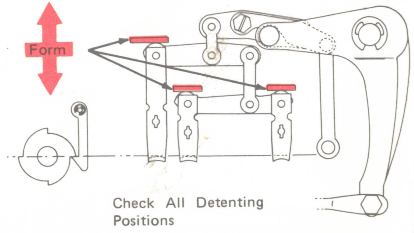
42 ROTATE SPRING TENSION



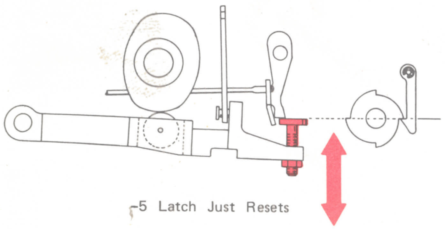
L/C–5 Half Cycled

Code Bail Shift Link Disconnected

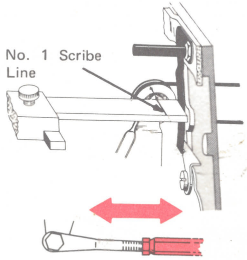
43 ROTATE SELECTOR LATCHES



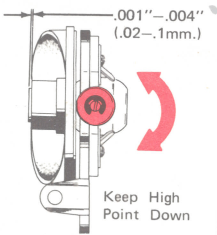
44 ROTATE SELECTOR LATCHES



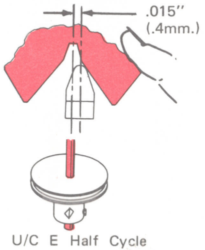
45 ROTATE ARM VERTICAL



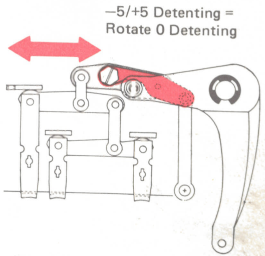
46 SHIFT CAM BACK UP ROLLER



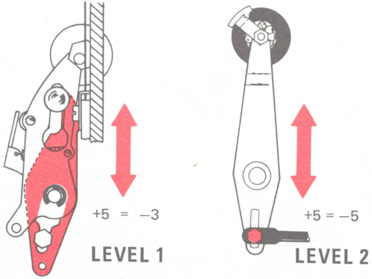
47 PRELIMINARY ROTATE HOMING



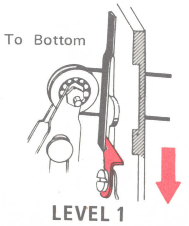
48 BALANCE LEVER



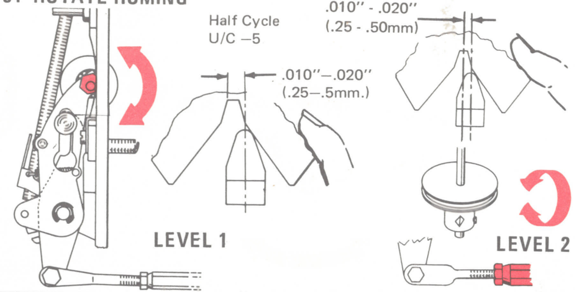
49 ROTATE ARM MOTION



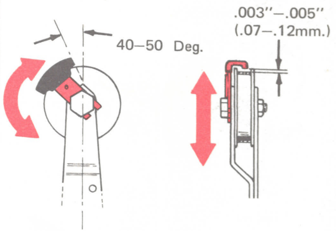
50 DAMPER SPRING – PRELIMINARY



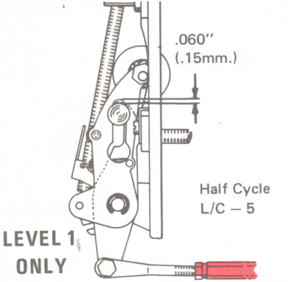
51 ROTATE HOMING



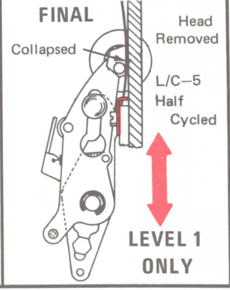
52 ROTATE PULLEY GUARD



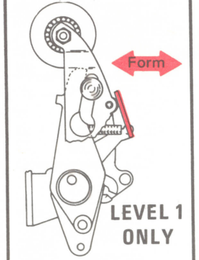
53 ROTATE LINK



54 DAMPER SPRING FINAL

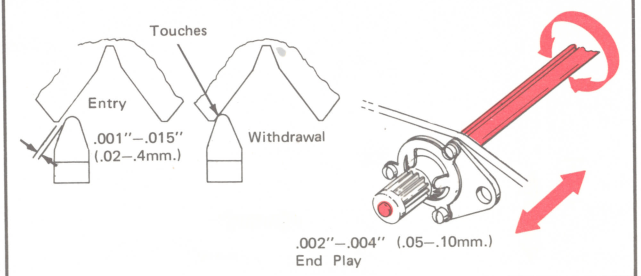


55 RATIO CHANGE

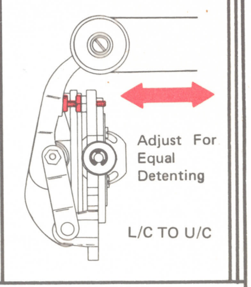


–3 Detent = –5 Detent

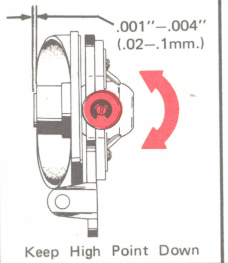
56 PRINT SHAFT TIMING FINAL



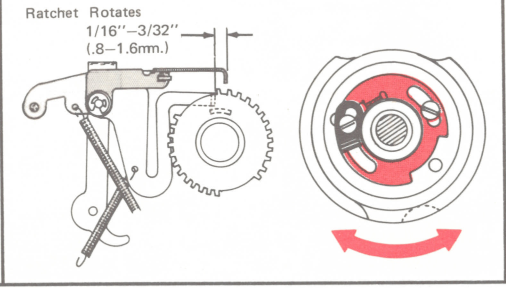
57 SHIFT MOTION



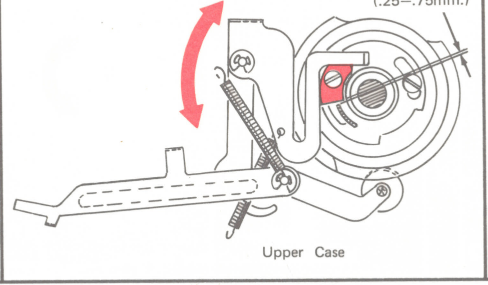
58 SHIFT CAM BACK UP ROLLER



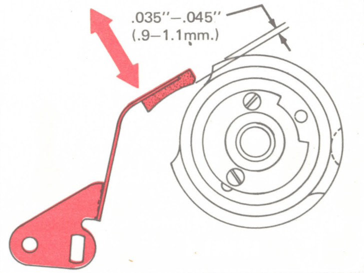
59 SHIFT CLUTCH SPRING RETAINER



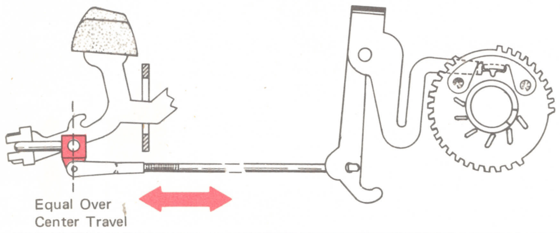
60 SHIFT OVERTHROW STOP



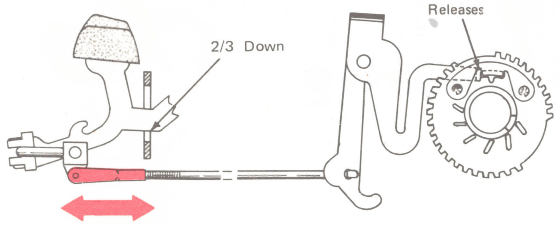
61 SHIFT CAM BRAKE



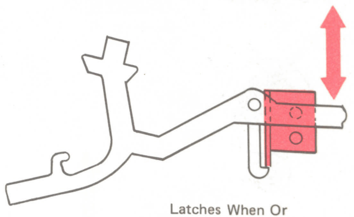
62 SHIFT BAIL BELLCRANK



63 SHIFT RELEASE LINK

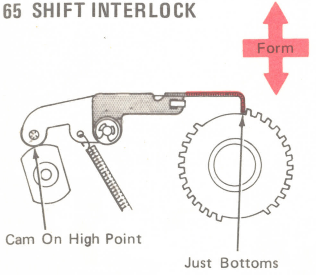


64 SHIFT LOCK

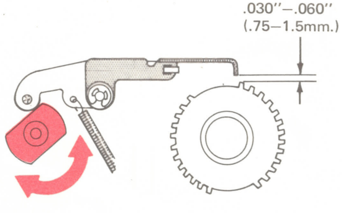


Latches When Or
Just After Shift
Ratchet Is Released

65 SHIFT INTERLOCK

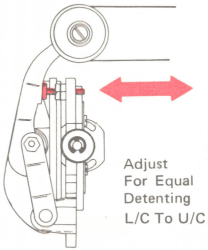


66 SHIFT INTERLOCK CAM



Filter Shaft Biased Forward

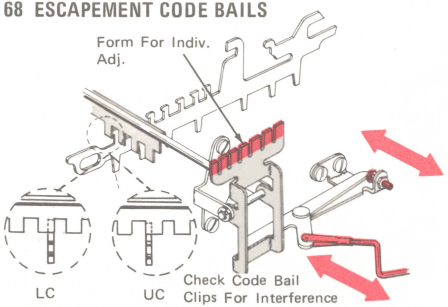
67 SHIFT MOTION



Adjust
For Equal
Detenting
L/C To U/C

51

68 ESCAPEMENT CODE BAILS



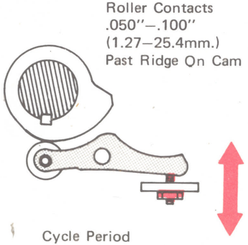
Check Code Bail
Clips For Interference

69

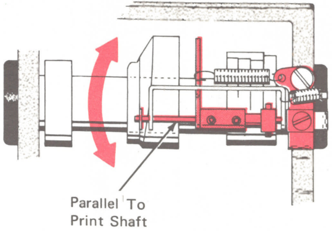
Check
Interlocks

Frames
334-351

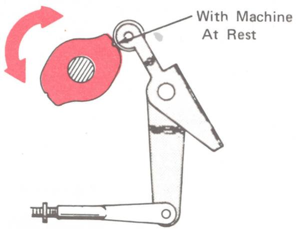
70 PRINT CAM FOLLOWER STOP SCREW



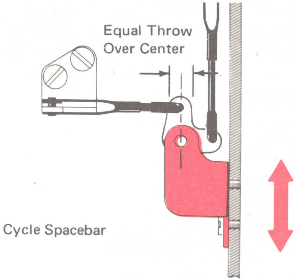
71 TAB CARD ANCHOR BRACKET



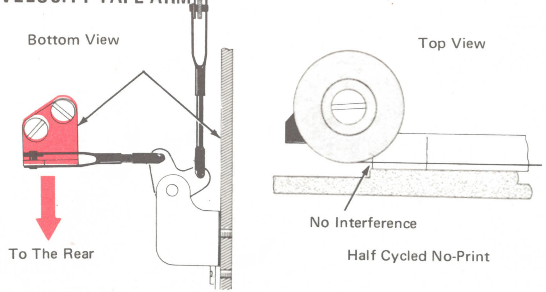
72 VELOCITY CONTROL CAM



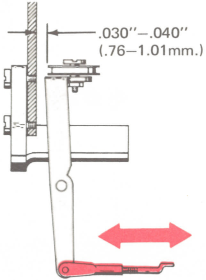
73 VELOCITY CONTROL BELLCRANK



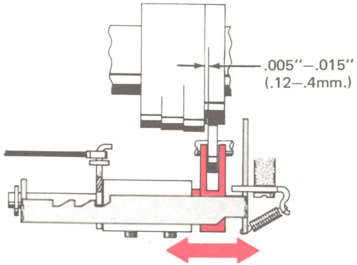
74 VELOCITY TAPE ARM



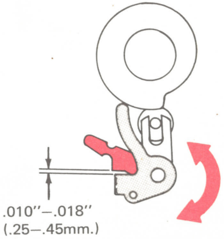
75 VELOCITY TAPE ARM



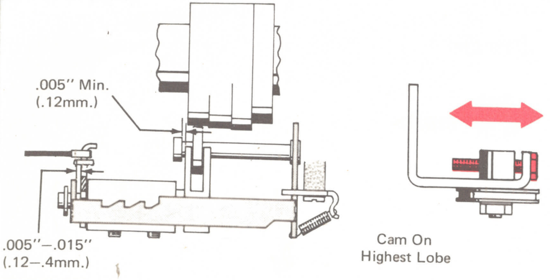
76 VELOCITY SHIFT YOKE



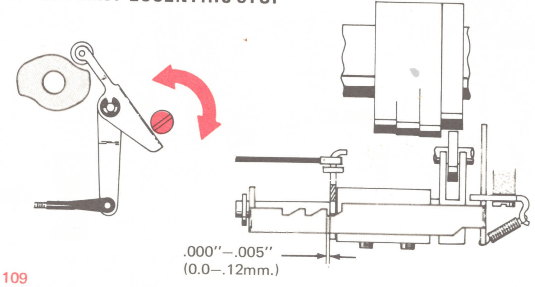
77 VELOCITY TAPE CONNECTOR



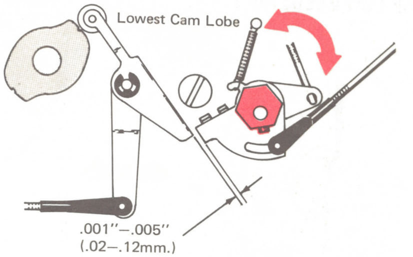
78 R. H. VELOCITY TAPE PULLEY



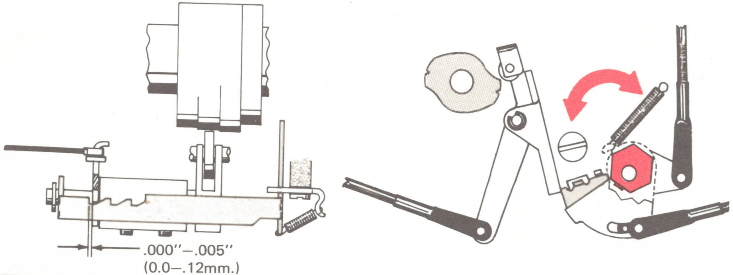
79 NO PRINT ECCENTRIC STOP



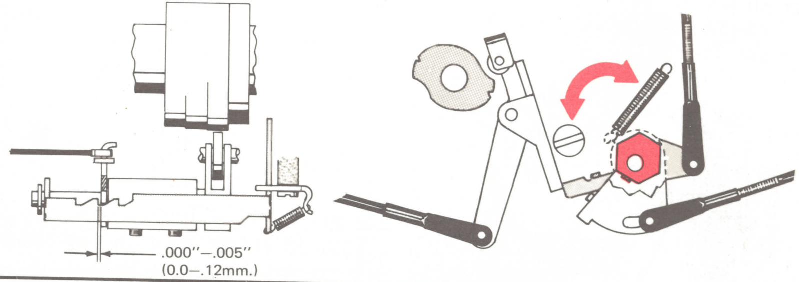
80 HIGH VELOCITY STOP



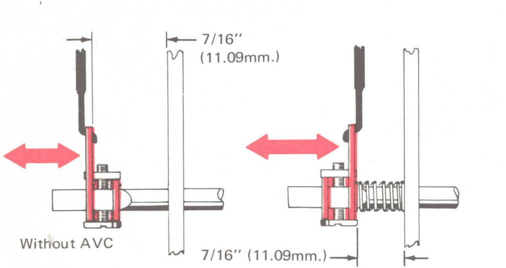
81 MEDIUM VELOCITY STOP



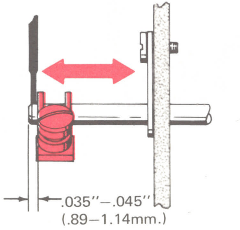
82 LOW VELOCITY STOP



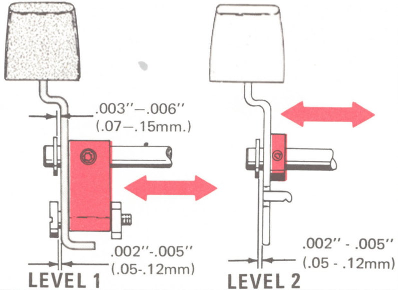
83 LOW VELOCITY BAIL LEVER



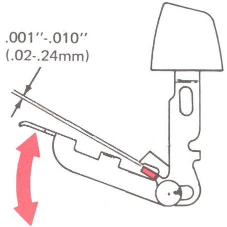
84 MEDIUM VELOCITY BAIL LEVER



85 NO PRINT KEYLEVER

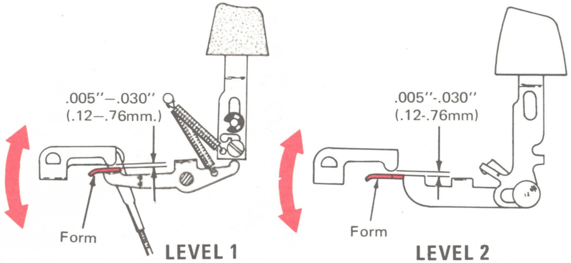


86 NO PRINT LATCH

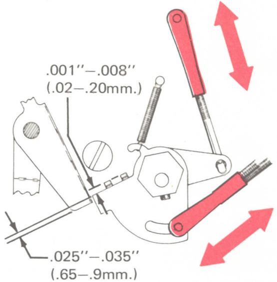


87 NO PRINT BELLCRANK LEVER

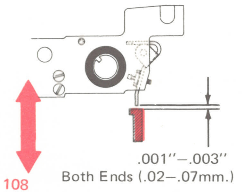
NO PRINT BAIL LEVER



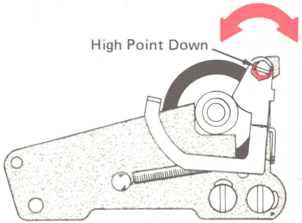
88 VELOCITY STOP LINKS



89 CARRIER SUPPORT

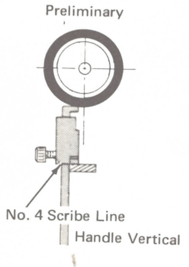


90 PLATEN LATCHES

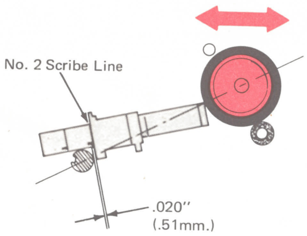


Hold Platen Firmly Both Ends.

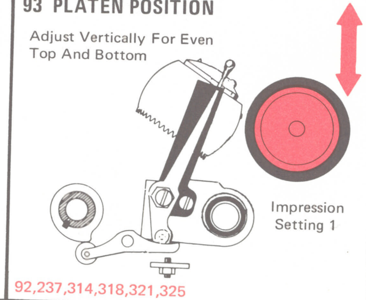
91 PLATEN POSITION



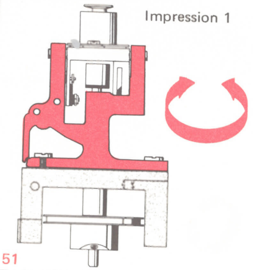
92 PLATEN POSITION



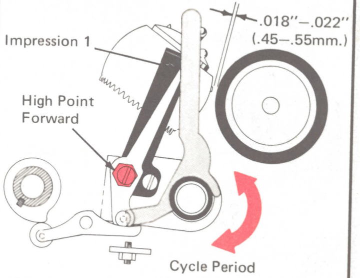
93 PLATEN POSITION



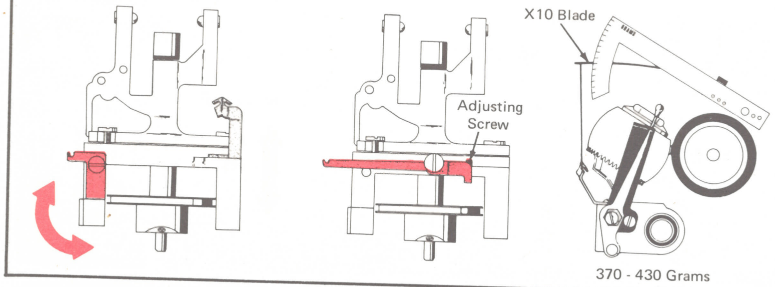
94 EVEN SIDE TO SIDE



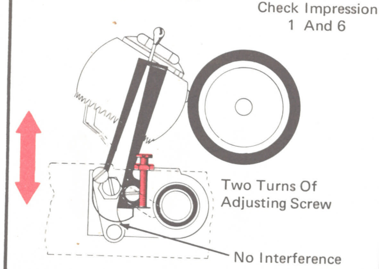
95 VELOCITY RATIO



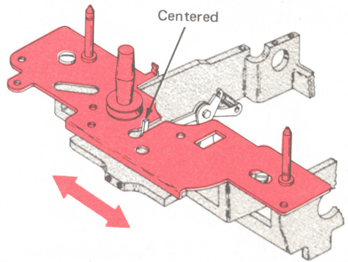
96 ROCKER RETURN SPRING



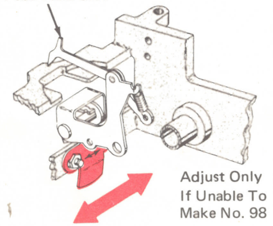
97 ROCKER UP STOP



98 RIBBON FEED PLATE



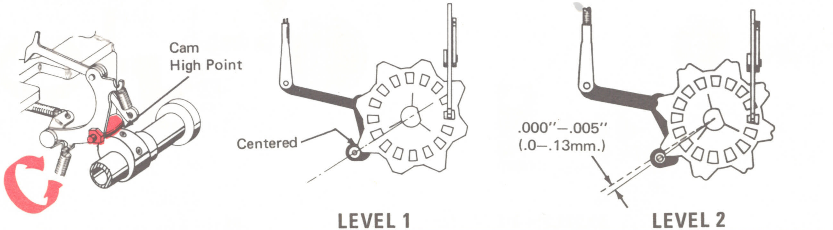
99 RIBBON FEED PLATE



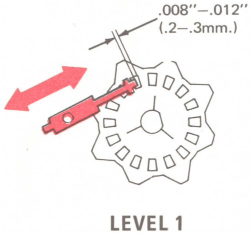
Centered In Feed Plate Slot

Adjust Only If Unable To Make No. 98

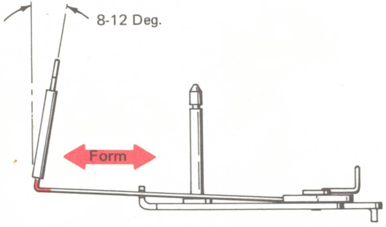
100 FEED CAM FOLLOWER



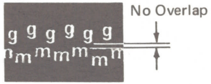
101 DETENT SPRING



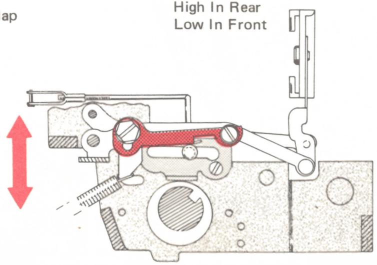
102 SHOCK SPRING



103 LIFT GUIDE PLATE

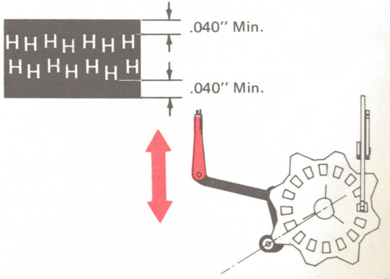


g g g g g g
m m m m m m
No Overlap

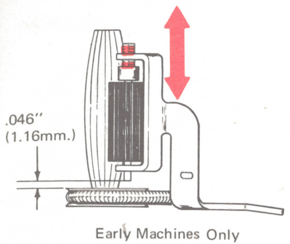


High In Rear
Low In Front

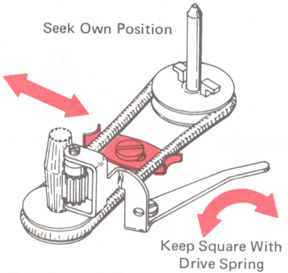
104 LIFT CONTROL LINK



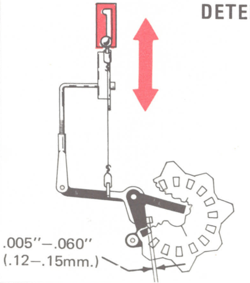
105 PRESSURE ROLLER



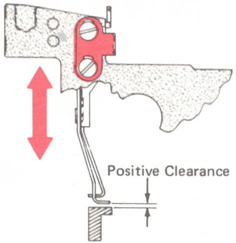
106 DRIVE SPRING GUIDE



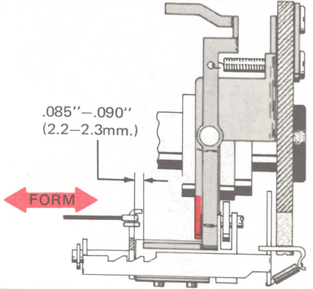
107 RIBBON CONTROL LEVER DETENT



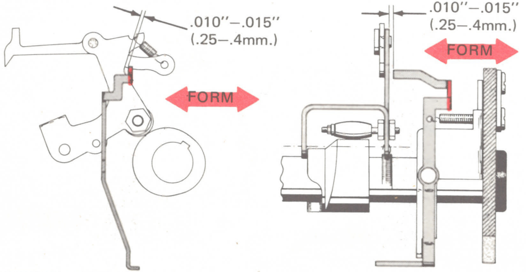
108 RIBBON LOCKOUT LEVER BRACKET



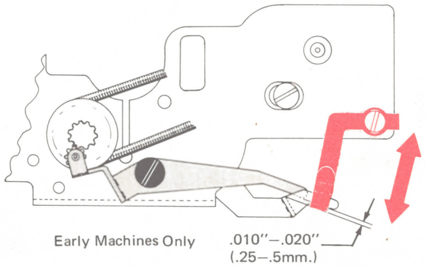
109 LOCKOUT LEVER STOP



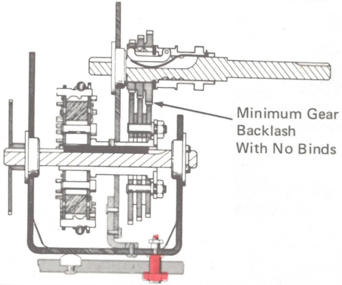
110 LOCKOUT LEVER



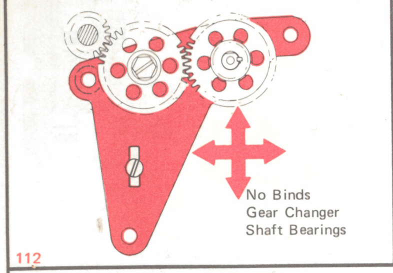
111 LOAD LEVER BELLCRANK DETENT



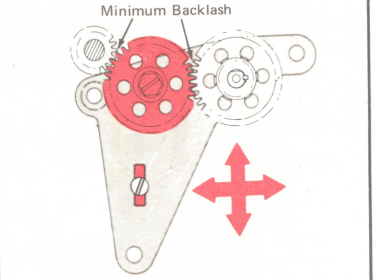
112 PINWHEEL JACK SCREW



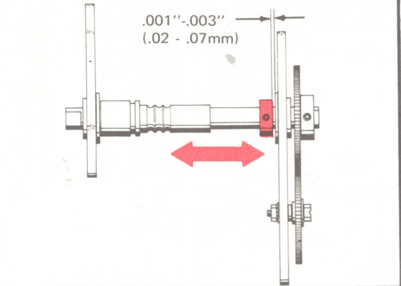
113 IDLER GEAR MOUNTING BRACKET



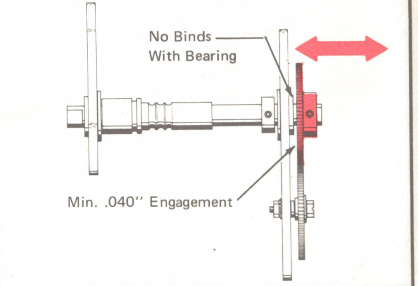
114 IDLER GEAR BACKLASH



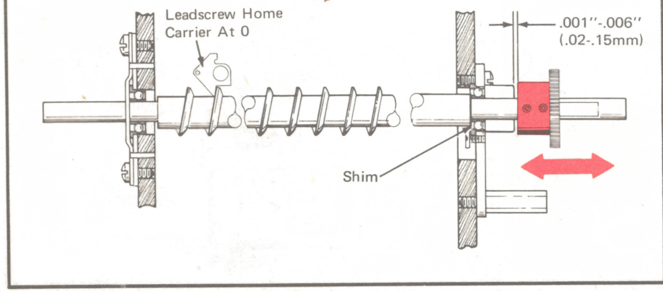
115 GEAR CHANGER SHAFT ENDPLAY



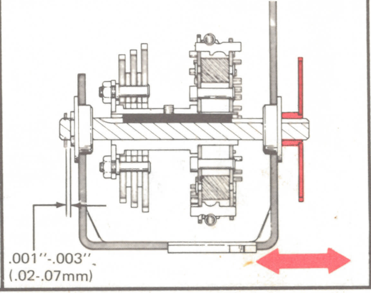
116 INTERMEDIATE GEAR



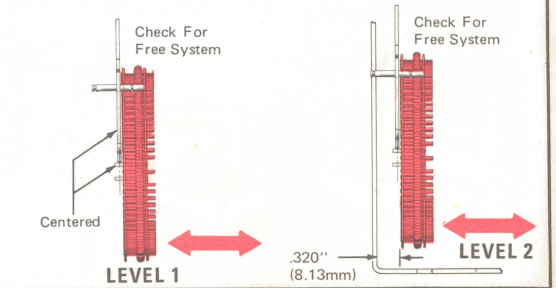
117 LEADSCREW ENDPLAY



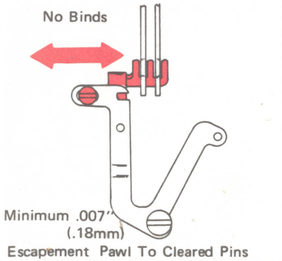
118 PINWHEEL SHAFT ENDPLAY



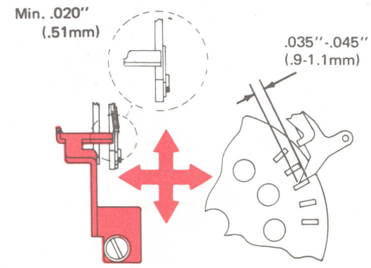
119 PINWHEEL POSITION



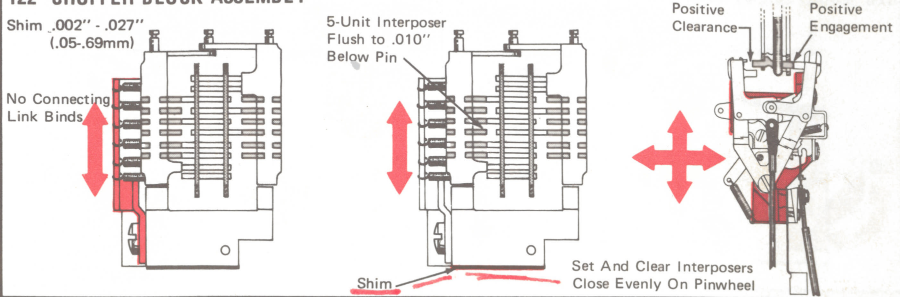
120 PAWL GUIDE



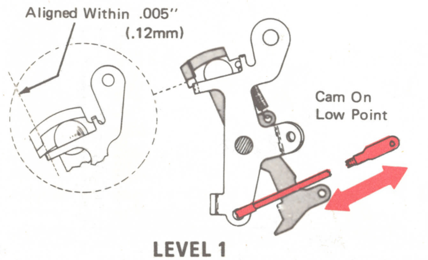
121 ESCAPEMENT PAWL BITE



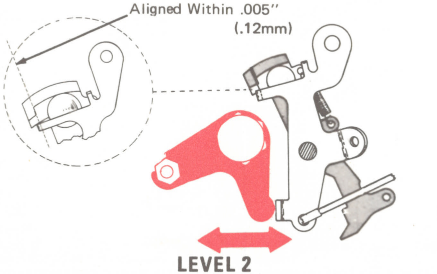
122 CHOPPER BLOCK ASSEMBLY



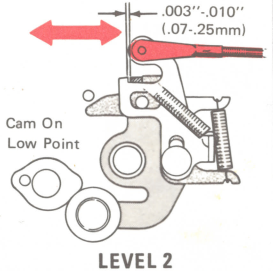
123 ESCAPEMENT TRIP LINK



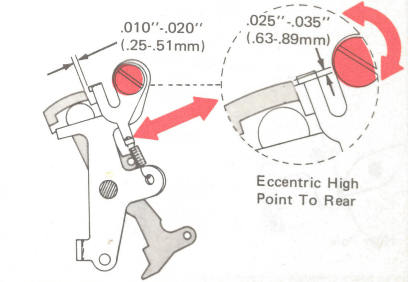
TRIP LEVER BACKSTOP



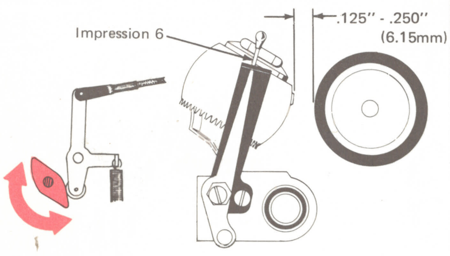
124 ESCAPEMENT TRIP LINK



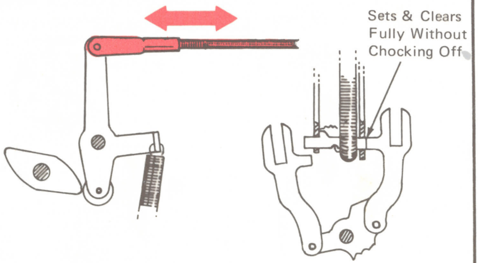
125 TRIP LEVER EXTENSION



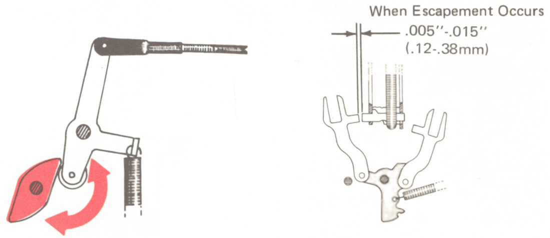
126 ESCAPEMENT CAM TIMING



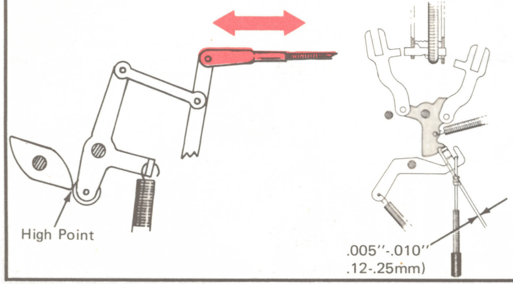
127 CHOPPER BAR LINK



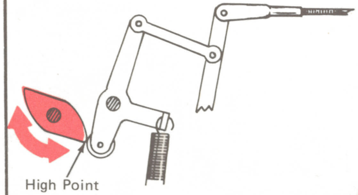
128 CHOPPER BAR CAM TIMING



129 INTERPOSER RESTORING LINK

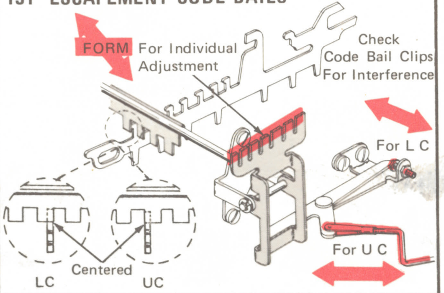


130 INTERPOSER RESTORING CAM TIMING

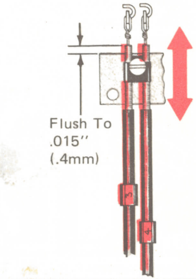


With Cycle Shaft Checked At Home Pos.

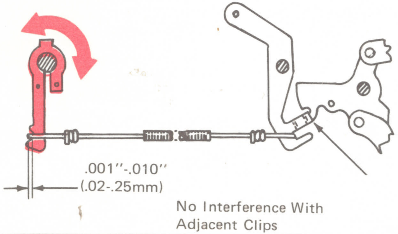
131 ESCAPEMENT CODE BAILS



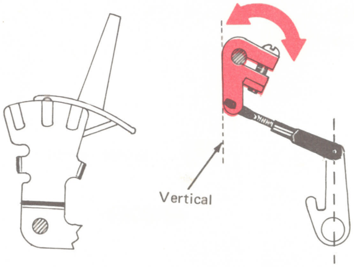
132 ESCAPEMENT CABLES



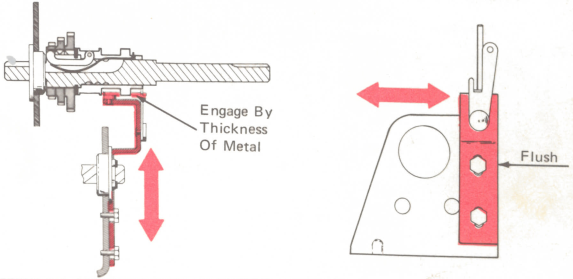
133 ESCAPEMENT CODE BAIL CLIPS



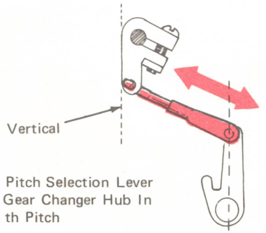
134 PITCH SELECTOR LEVER LINKAGE



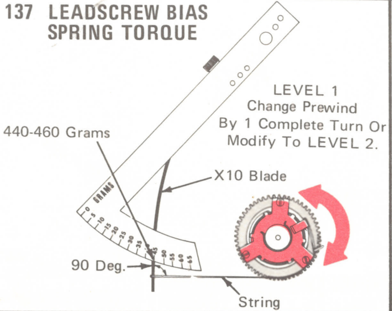
135 PITCH SELECTOR BRACKET



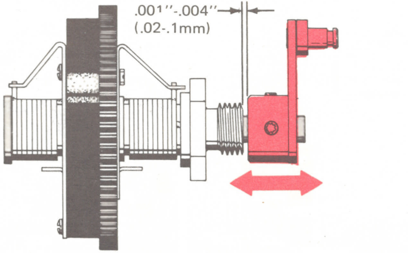
136 PITCH SELECTOR LINK



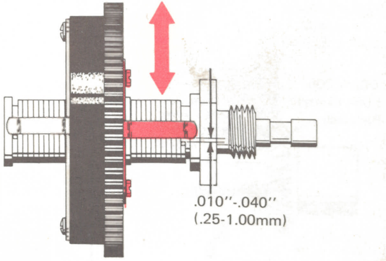
137 LEADSCREW BIAS SPRING TORQUE



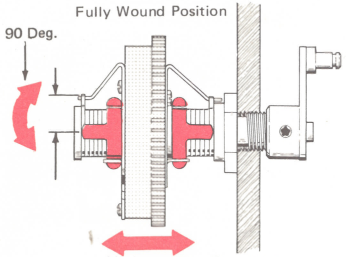
138 DRIVING ARBOR ENDPLAY



139 HOLDING SPRING RELEASE ARM

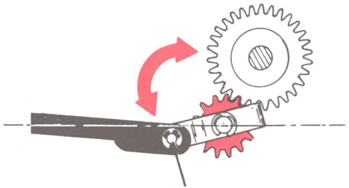


140 SPRING CLAMPS



Minimum Side Play Of Gear

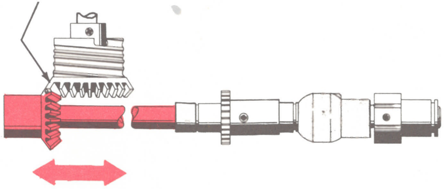
141 REWIND DRIVE GEAR



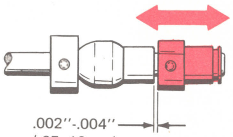
1/2 Tooth Below Straight Line

142 GEAR MESH

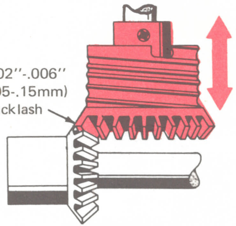
These Two Surfaces Even



143 OPERATIONAL SHAFT ENDPLAY

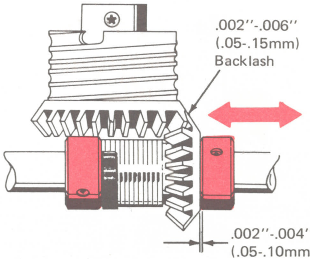


144 TAB CORD DRUM

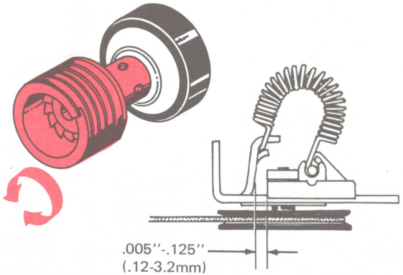


142

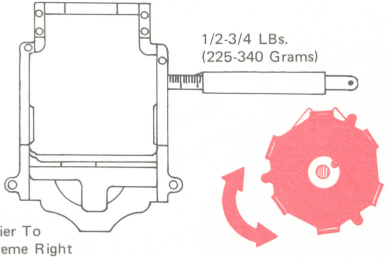
145 TAB GOVERNOR PINION



146 CORD TENSION



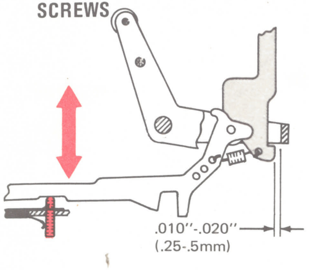
147 MAINSPRING TENSION



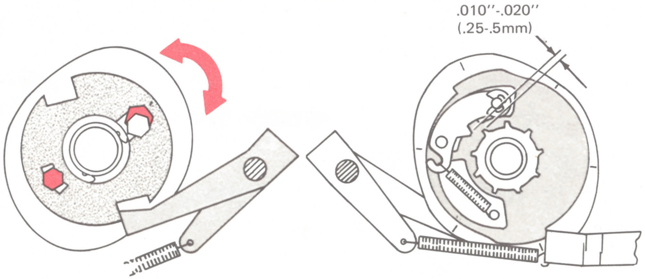
Carrier To Extreme Right

6 1/3-6 2/3 Turns

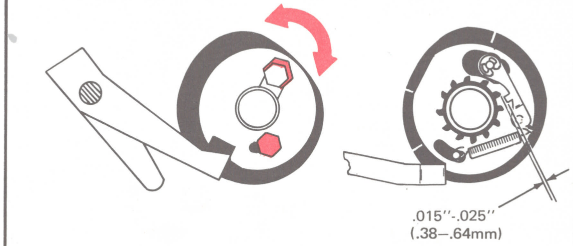
148 INTERPOSER ADJUSTING SCREWS



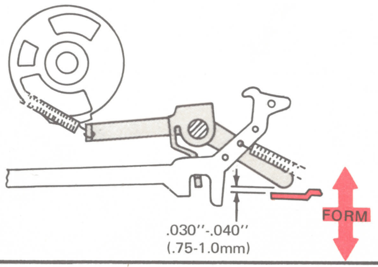
149 TAB/B.S. CAM PAWL CLEARANCE



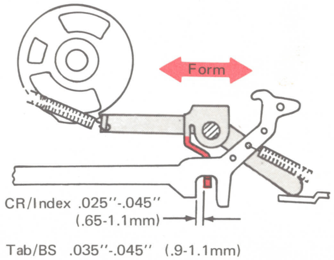
150 C/R CAM PAWL CLEARANCE



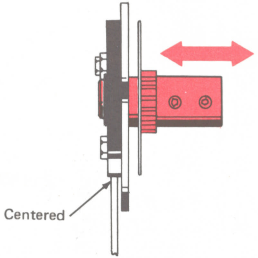
151 CLUTCH RELEASE ARM STOPS



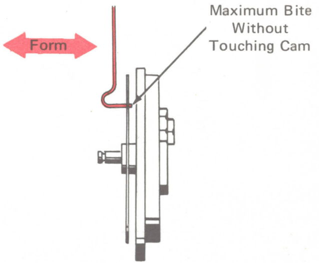
152 CLUTCH RELEASE ARM



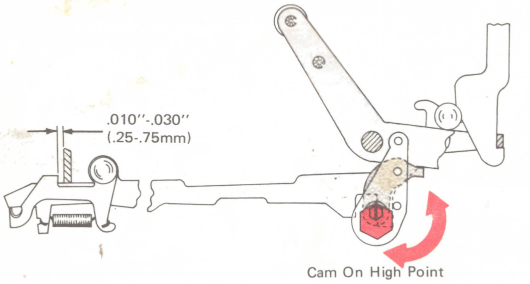
153 TAB/B.S. CAM POSITION



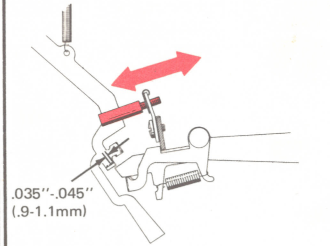
154 CLUTCH RELEASE ARM LATERAL



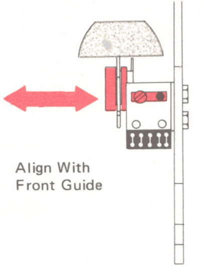
155 INTERPOSER RESTORING LEVER



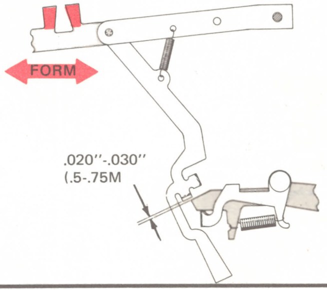
156 C/R KEYLEVER PAWL OVERLAP



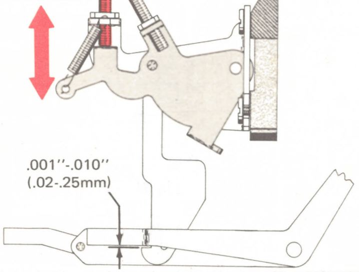
157 CARRIER RETURN KEYLEVER GUIDE



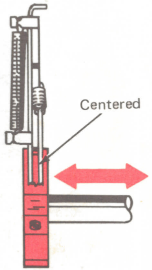
158 CARRIER RETURN KEYLEVER



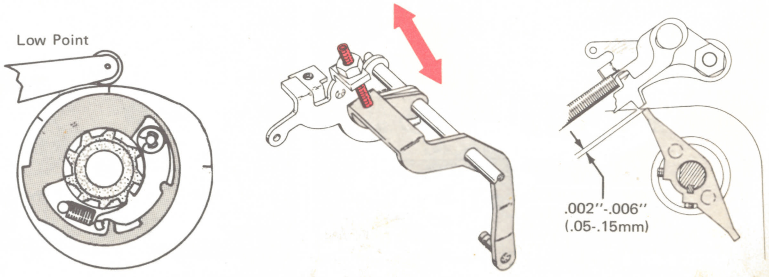
159 CARRIER RETURN OPERATIONAL LATCH HEIGHT



160 HOMING STOP

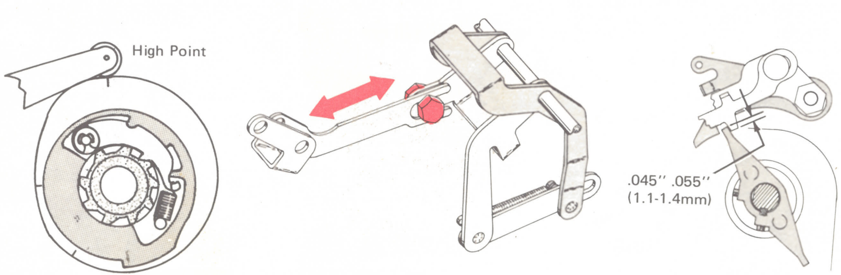


161 HOMING PAWL CLEARANCE

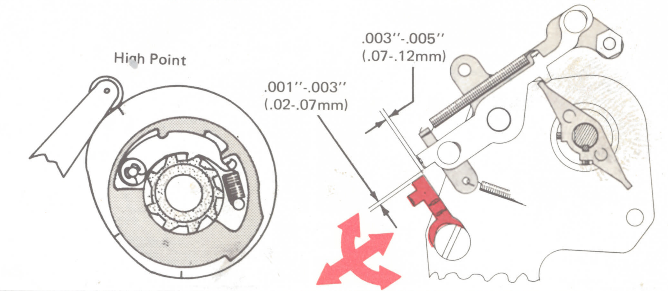


180

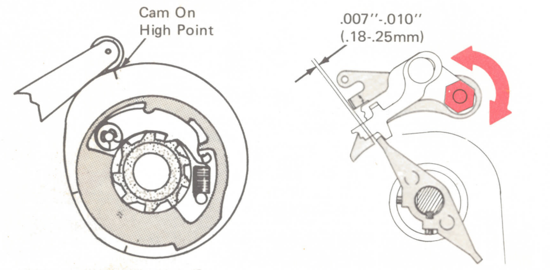
162 HOMING PAWL BITE



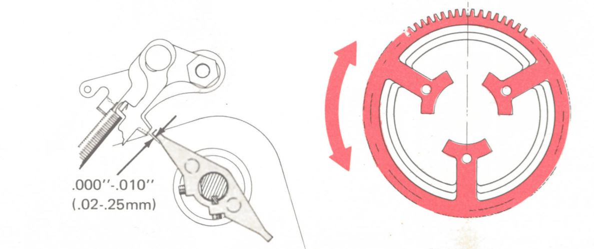
163 HOMING PAWL LATCH



164 REBOUND CHECK PAWL ECCENTRIC

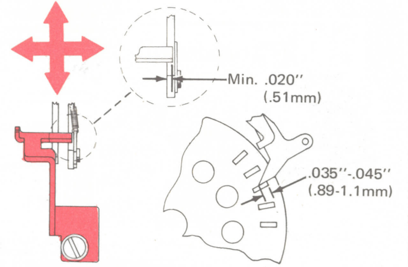


165 GEAR CHANGER SHAFT HOMING

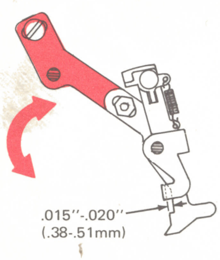


Check All
Three Pitches

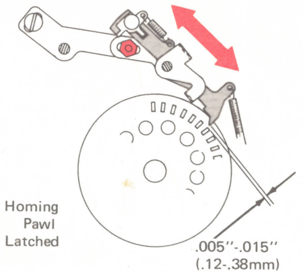
166 ESCAPEMENT PAWL BITE SETTER



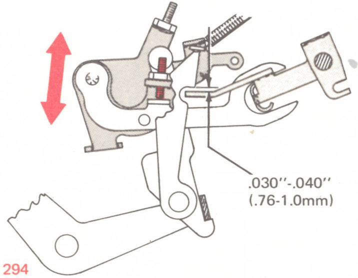
167 PAWL RELEASE ARM



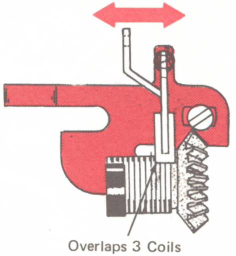
168 PAWL RELEASE CLEARANCE



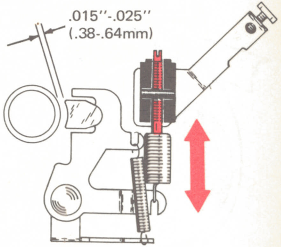
169 CLUTCH LATCH OVERTHROW



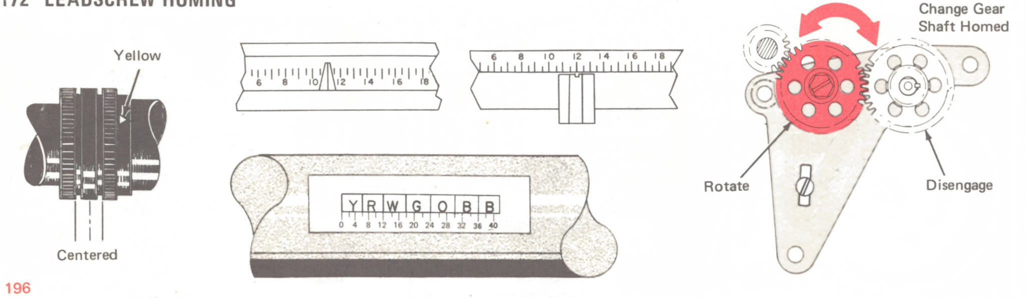
170 CARRIER RETURN SHOE



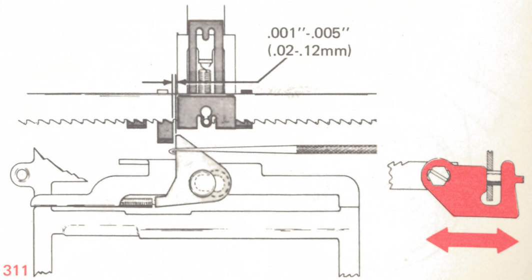
171 C/R SHOE CLEARANCE



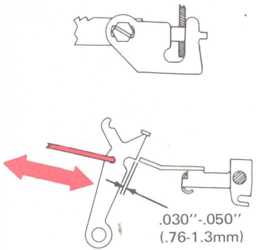
172 LEADSCREW HOMING



173 OVERBANK GUIDE



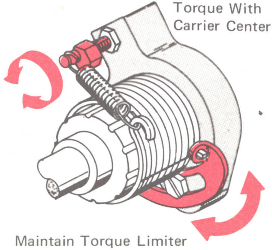
174 CLUTCH UNLATCHING LINK



.030"-.050"
(.76-1.3mm)

175 TORQUE LIMITER

4 3/4 to 5 1/4 Lb.
Torque With
Carrier Centered



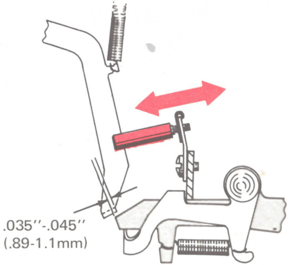
Maintain Torque Limiter
End Play .004"-.006" (.10-.15mm)

176

Check Interlocks

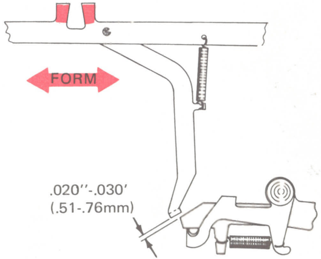
334-351

177 TAB PAWL GUIDE



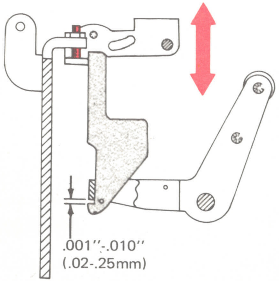
.035"-.045"
(.89-1.1mm)

178 TAB KEYLEVER



.020"-.030'
(.51-.76mm)

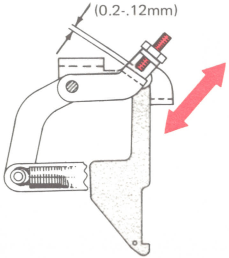
179 TAB OPERATIONAL LATCH HEIGHT



.001"-.010"
(.02-.25mm)

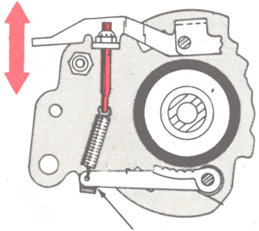
180 TAB LATCH ARM SCREW

.001"-.005"
(0.2-.12mm)



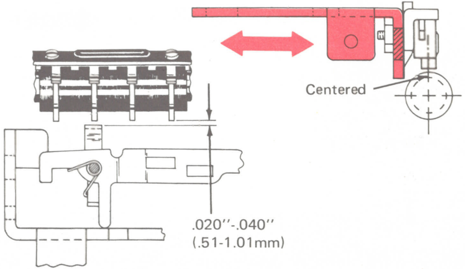
161

181 BRAKE DRIVE ARM STUD



Just Touches

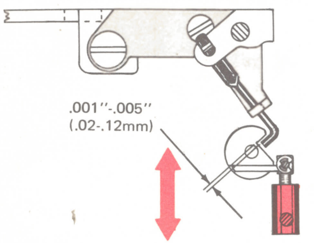
182 ESCAPEMENT BRACKET



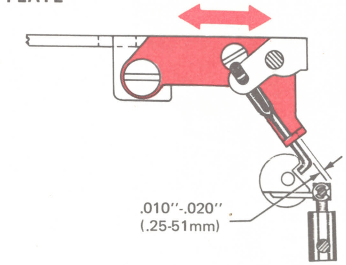
Centered

.020"-.040"
(.51-1.01mm)

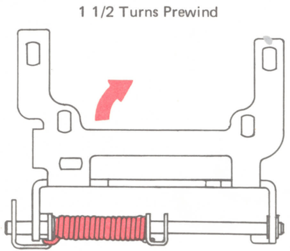
183 TORQUE BAR ACTUATING LINK



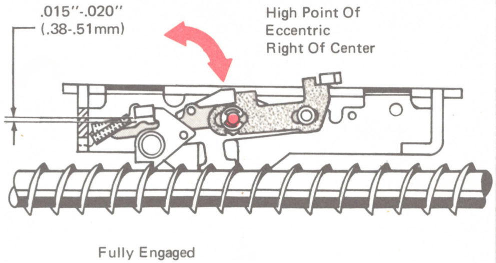
184 TAB ACTUATING LINK GUIDE PLATE



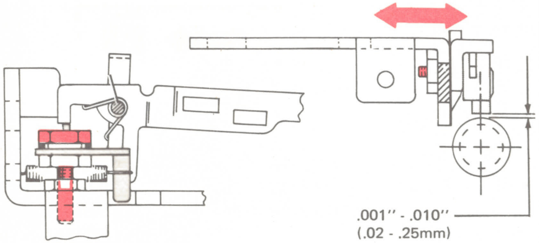
185 TAB TORSION SPRING



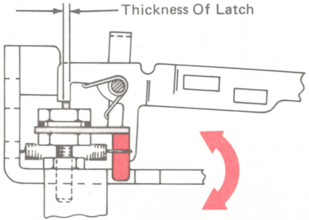
186 SHOE ARM ECCENTRIC



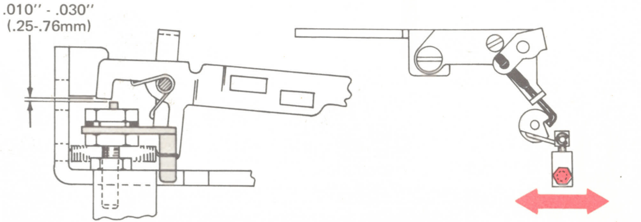
187 TAB LATCH MOUNTING SCREW



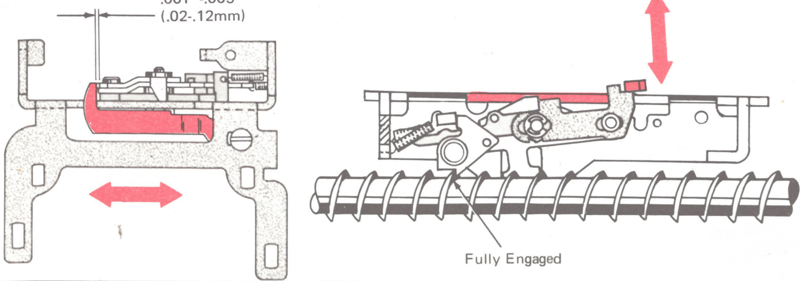
188 TAB LATCH BITE



189 TORQUE BAR LINK STUD

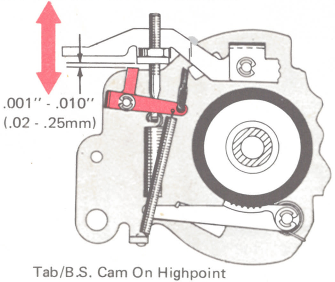


190 LATCH STOP



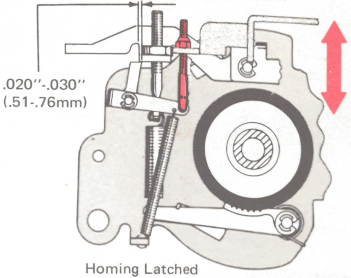
Fully Engaged

191 BRAKE LATCH HEIGHT



Tab/B.S. Cam On Highpoint

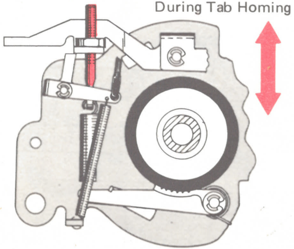
192 BRAKE UNLATCHING LINK



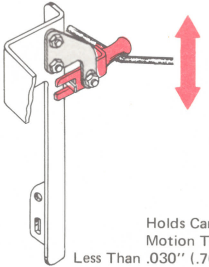
Homing Latched

193 BRAKE DRIVE ARM STUD

Just Short Enough To Hold Escapement Shaft During Tab Homing

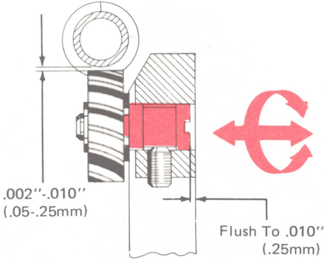


194 CORD TIGHTENER

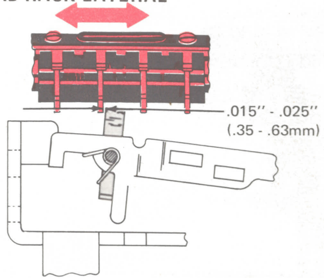


Holds Carrier Motion To Less Than .030" (.76mm)

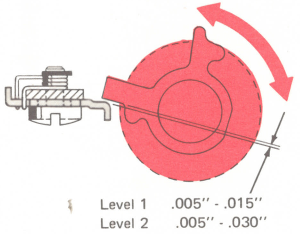
195 LEADSCREW SUPPORT GEAR



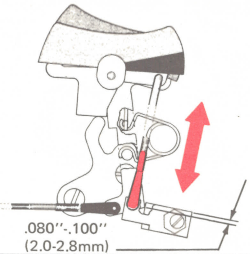
196 TAB RACK LATERAL



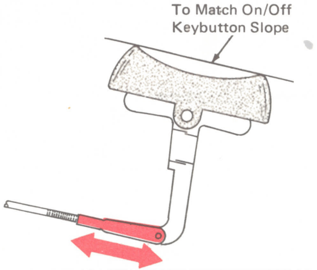
197 TAB RACK - RADIAL



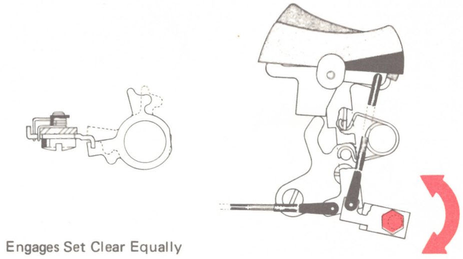
198 TAB LOCATE STOP LINK



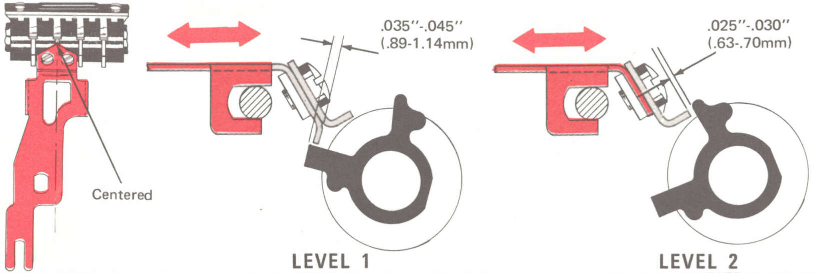
199 TAB SET AND CLEAR LINK



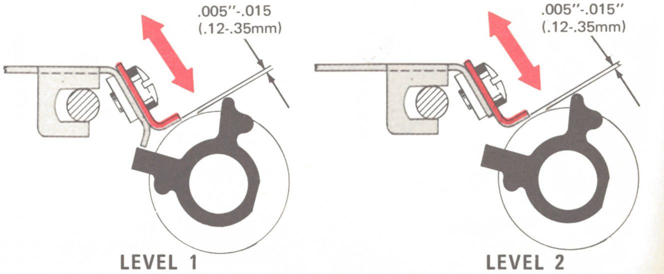
200 TAB LOCATE STOP ECCENTRIC



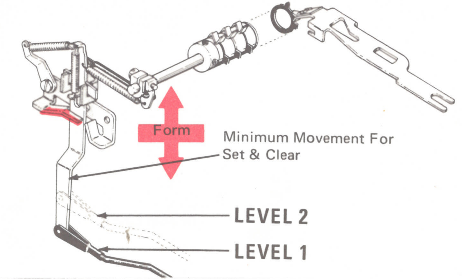
201 TAB SET AND CLEAR BRACKET



202 TAB SET AND CLEAR LINK

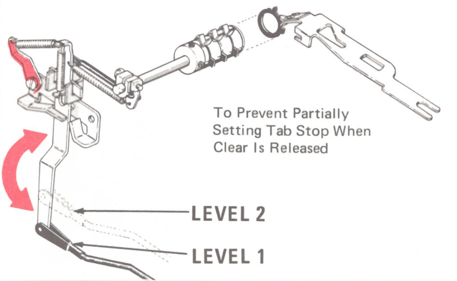


203 TAB ARM OVERTHROW STOPS



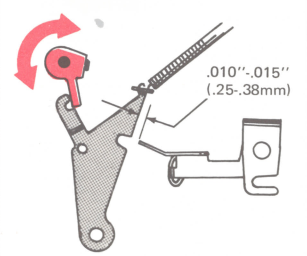
Minimum Movement For Set & Clear

204 REBOUND SPRING ARM



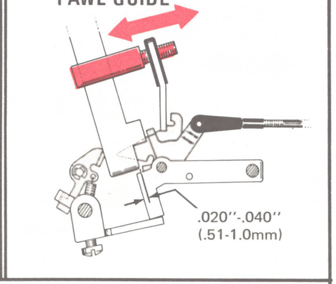
To Prevent Partially Setting Tab Stop When Clear Is Released

205 TAB TO CARRIER RETURN INTERLOCK



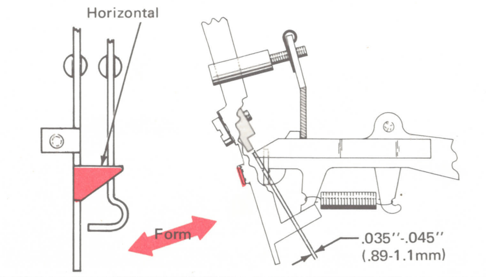
.010"-.015" (.25-.38mm)

206 CHARACTER BACKSPACE PAWL GUIDE



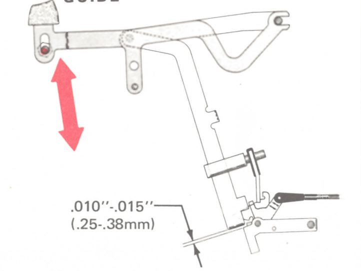
.020"-.040" (.51-1.0mm)

207 UNIT BACKSPACE PAWL



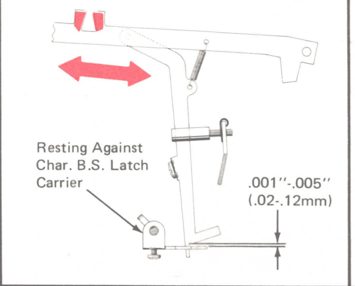
.035"-.045" (.89-1.1mm)

208 CHARACTER BACKSPACE KEYLEVER GUIDE



.010"-.015" (.25-.38mm)

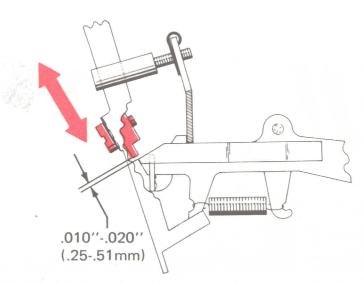
209 UNIT BACKSPACE KEYLEVER



Resting Against Char. B.S. Latch Carrier

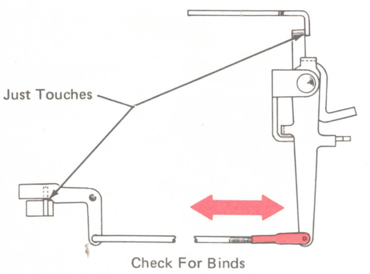
.001"-.005" (.02-.12mm)

210 UNIT BACKSPACE PAWL SHOE

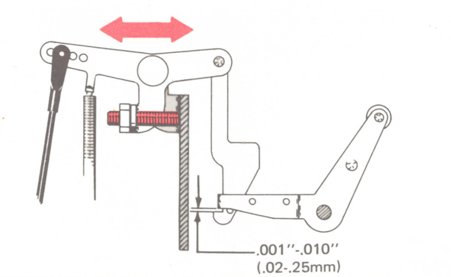


.010"-.020" (.25-.51mm)

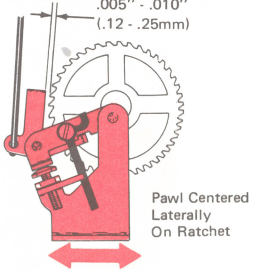
211 BACKSPACE OVERBANK LINK



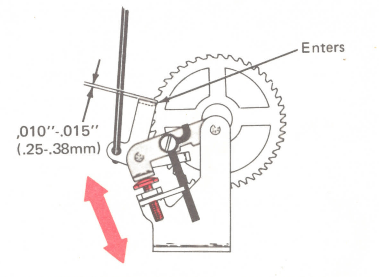
212 BACKSPACE OPERATIONAL LATCH HEIGHT



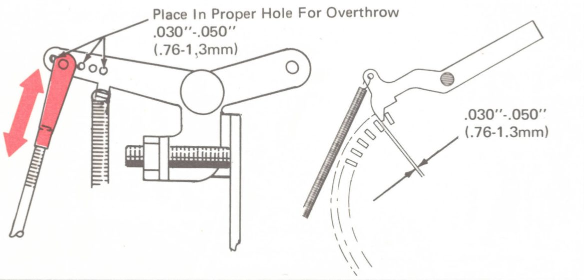
213 BACKSPACE PAWL LEVER MOUNTING



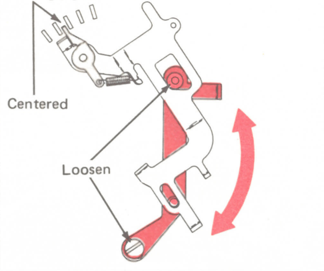
214 BACKSPACE PAWL LEVER STOP



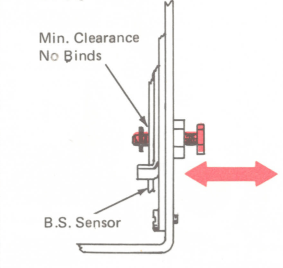
215 BACKSPACE LINK



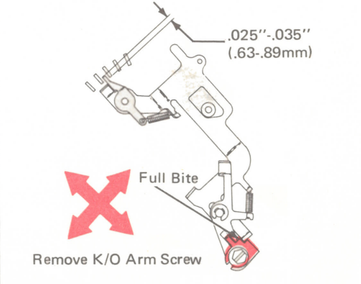
216 UPPER SENSOR MOUNTING STUD



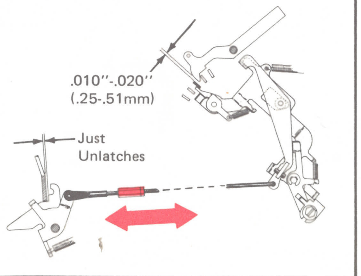
217 LOWER SENSOR MOUNTING STUD



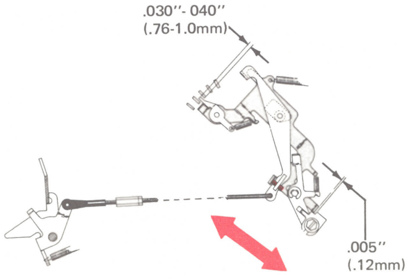
218 SENSOR LATCH (PRELIMINARY)



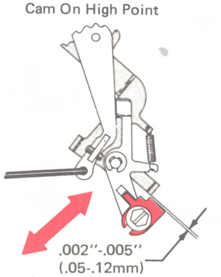
219 CHARACTER BACKSPACE K/O LINK



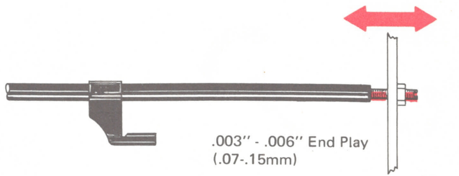
220 KNOCK/OFF ARM SCREEN



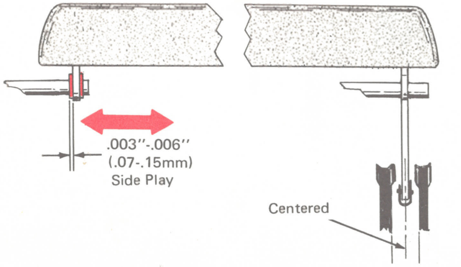
221 SENSOR LATCH - FINAL



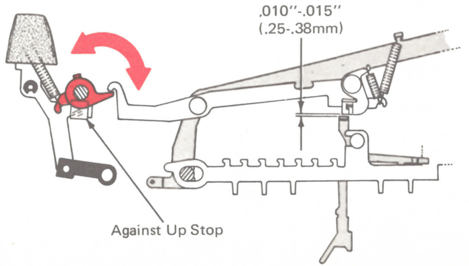
222 SPACEBAR SHAFT END PLAY



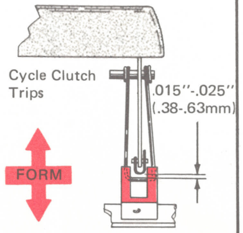
223 SPACEBAR KEYBUTTON



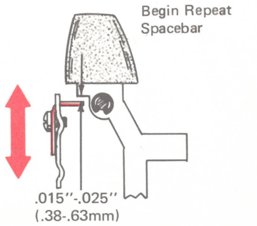
224 SPACEBAR CAM



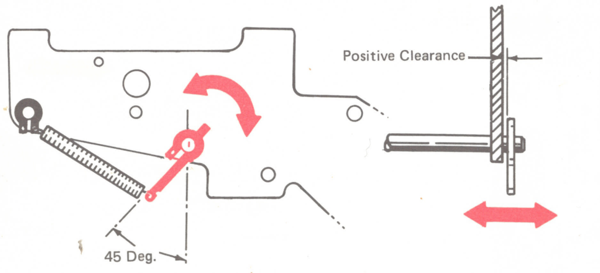
225 SPACEBAR REPEAT SPRING BRACKET



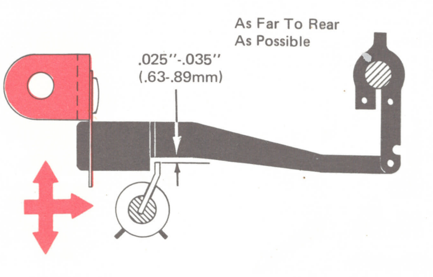
226 SPACEBAR DOWN STOP



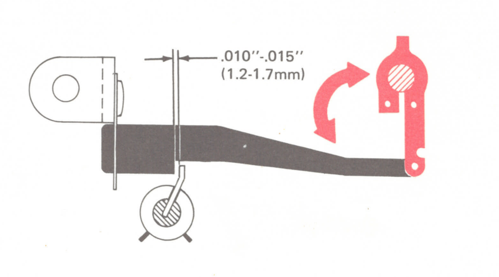
227 SPACEBAR VALUE SHAFT CLIP



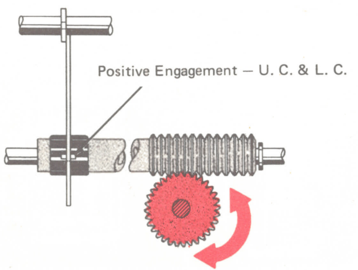
228 SPACEBAR PULL LINK GUIDE



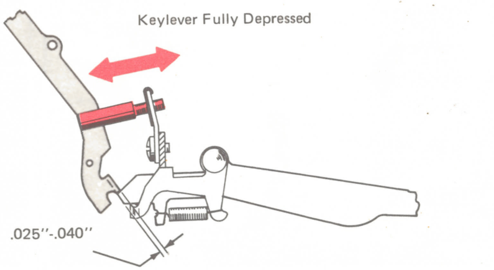
229 SPACEBAR PULL LINK



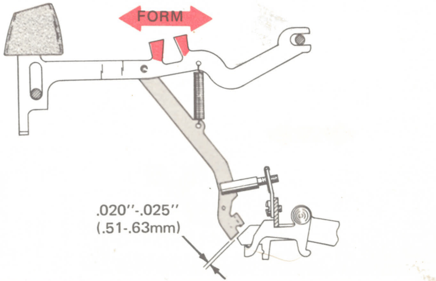
230 VALUE SHAFT PINION



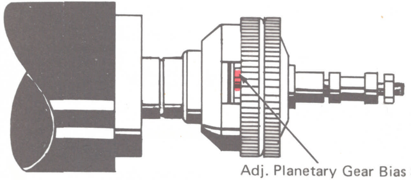
231 INDEX PAWL GUIDE



232 INDEX KEYLEVER

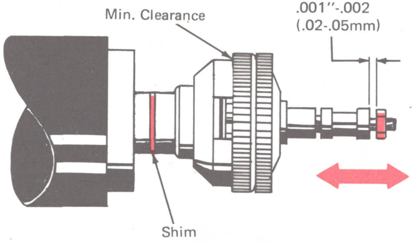


233 PLANETARY GEAR BIAS

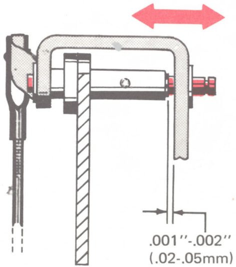


Adj. Planetary Gear Bias So Pin On Bias Plate Is 1/2 or Further Across Slot In Plated Driver

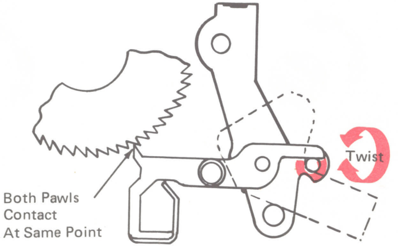
234 RATCHET END PLAY



235 PAWL CARRIER END PLAY

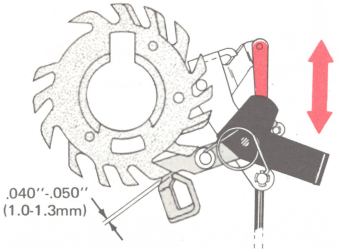


236 EQUAL PAWL ENTRY

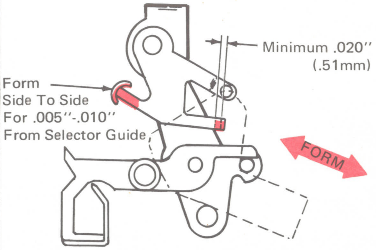


Both Pawls Contact At Same Point

237 INDEX LINK

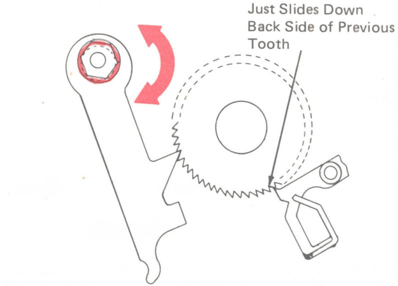


238 INDEX SELECTOR DETENT



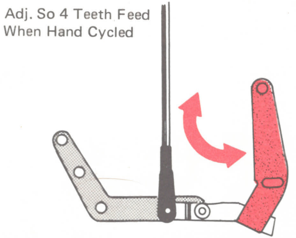
Form Side To Side For .005"-.010" From Selector Guide

239 RATCHET DETENTS



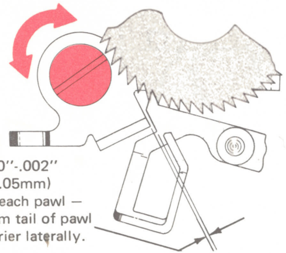
Just Slides Down Back Side of Previous Tooth

240 MULTIPLYING LEVER



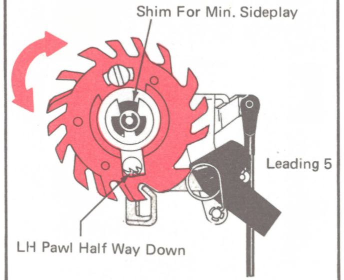
Adj. So 4 Teeth Feed When Hand Cycled

241 PLATEN OVERTHROW STOP

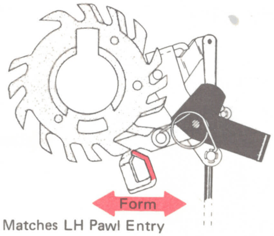


.000"-.002"
(.0-.05mm)
on each pawl –
form tail of pawl
carrier laterally.

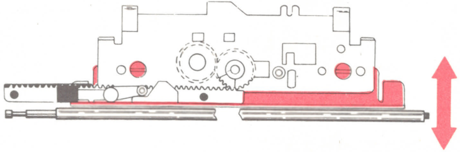
242 SELECTRIC GUIDE



243 RIGHT HAND PAWL GUIDE LUG

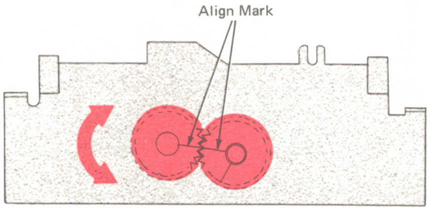


244 INDICATING RACK GUIDE

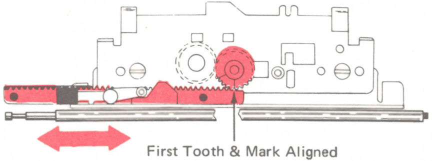


Min. Clearance, No Binds

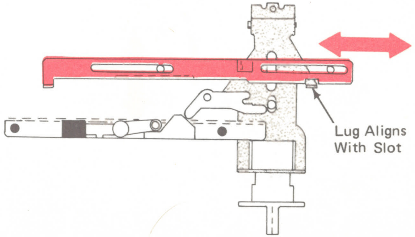
245 SENSING PINION GEAR ORIENTATION



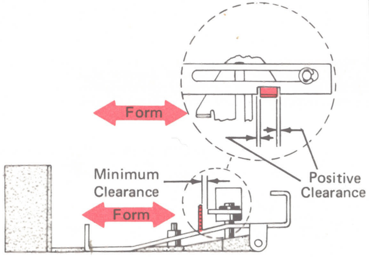
246 INDICATING RACK POSITION



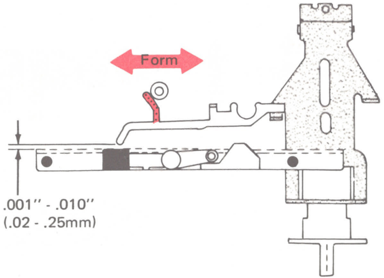
247 SENSING RACK POSITION



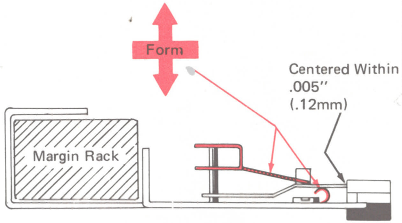
248 MARGIN SLIDER LUG



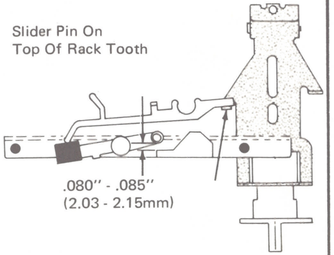
249 TRANSFER LEVER – HORIZONTAL



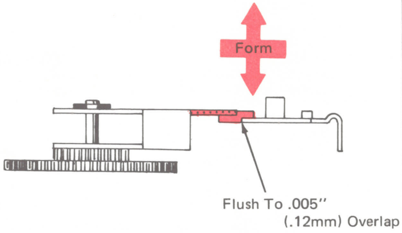
250 TRANSFER LEVER – VERTICAL



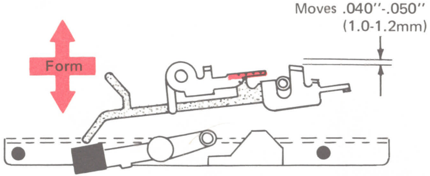
251 DISCONNECT LEVER CLEARANCE



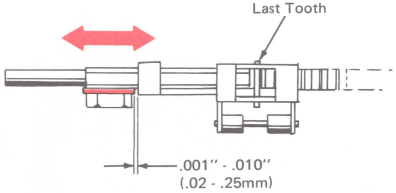
252 TRIP DISCONNECT LEVER – VERTICAL



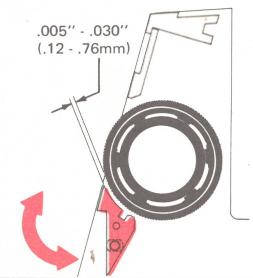
253 TRIP DISCONNECT LEVER – LATERAL



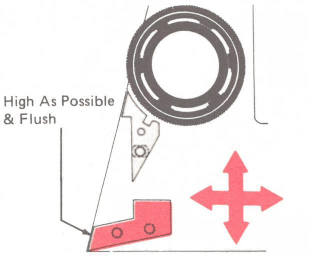
254 RIGHT HAND SET LEVER STOP



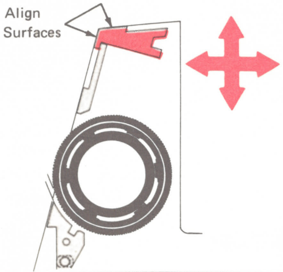
255 MARGIN SET SCALE



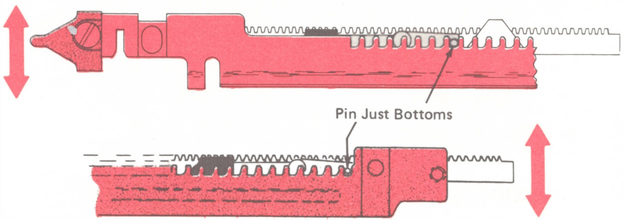
256 KEYLEVER SHIELD



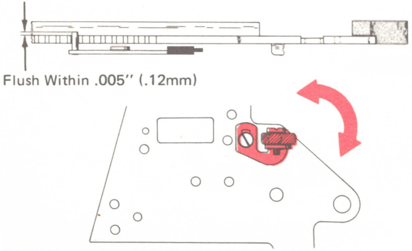
257 CARRIER POSITION SCALE



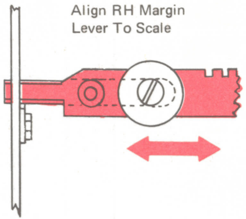
258 TRANSFER RACK



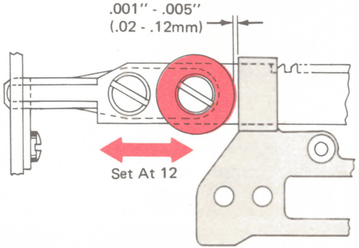
259 RIGHT MARGIN RACK (ANGULAR POSITION)



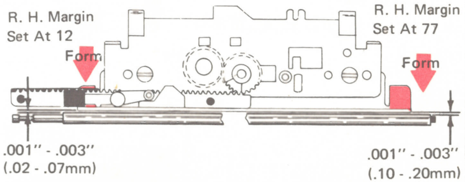
260 RIGHT HAND MARGIN



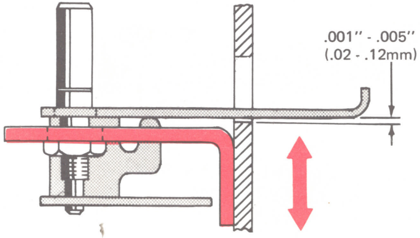
261 RIGHT HAND SET LEVER STOP



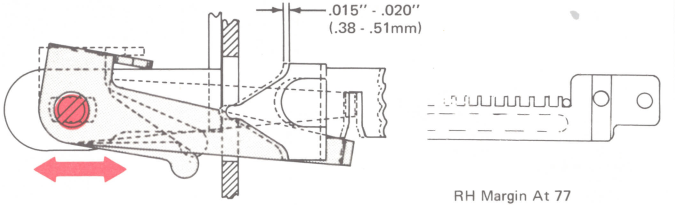
262 MARGIN TO TORQUE BAR CLEARANCE



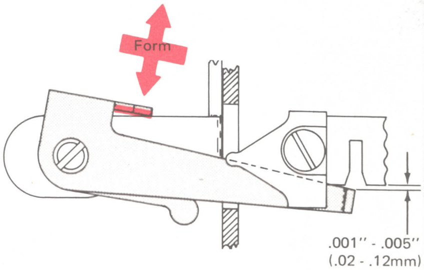
263 LOCK LEVER MOUNT BRACKET



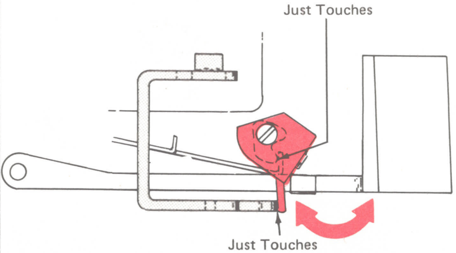
264 LOCK LEVER MOUNTING STUD



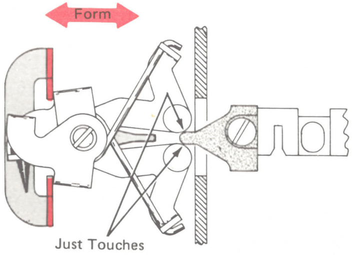
265 LOCK LEVER STOP EAR



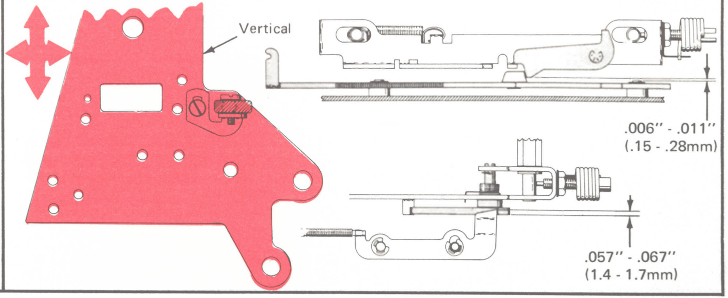
266 LOCK LEVER DRIVER



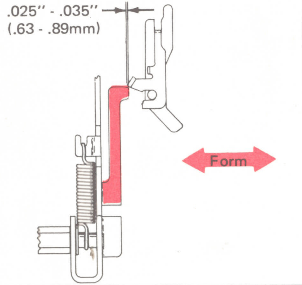
267 DECELERATOR ARM STOPS



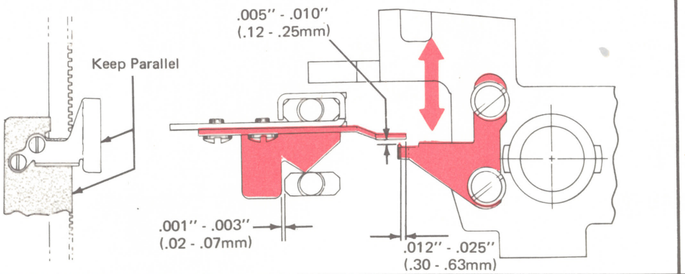
268 JUSTIFICATION PLATES



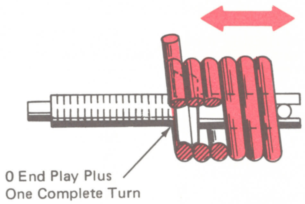
269 SENSING BRACKET TRIP LUG



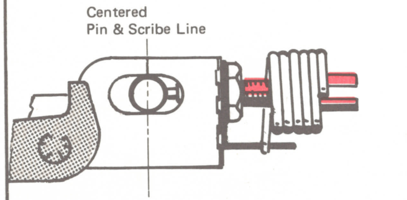
270 MARGIN RACK SUPPORT AND CARRIER BUFFER



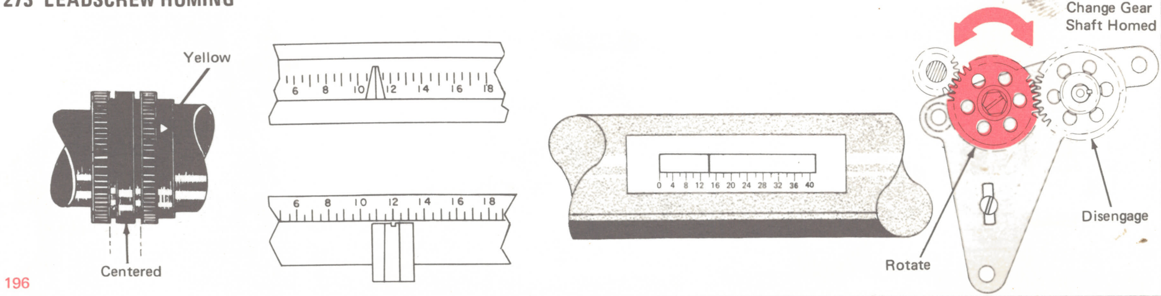
271 IMPACT PLUNGER SPRING



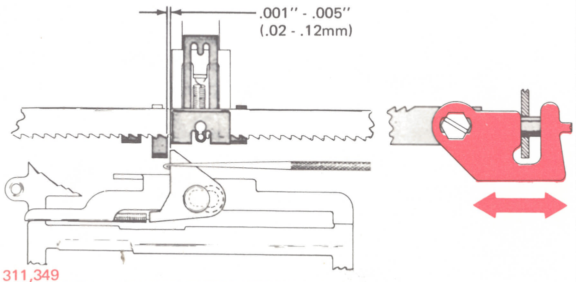
272 PRELIMINARY HOMING ADJUSTMENT



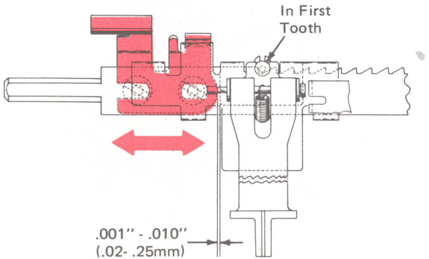
273 LEADSCREW HOMING



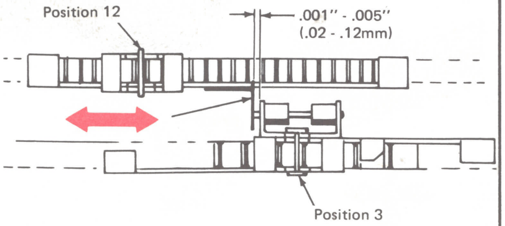
274 OVERBANK GUIDE



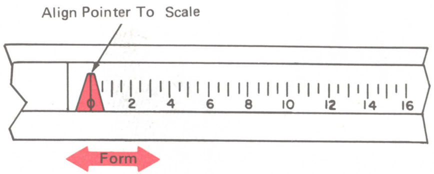
275 LEFT HAND MARGIN SET LEVER STOP



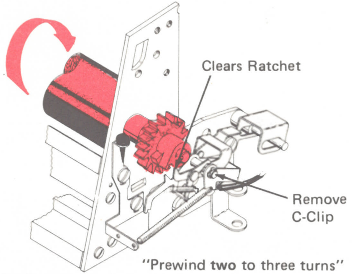
276 MARGIN CROSSOVER STOP



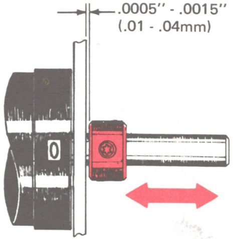
277 CARRIER POINTER



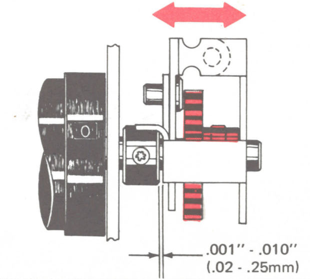
278 JUSTIFICATION TUBE CLOCK SPRING



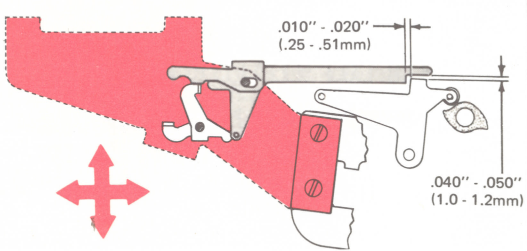
279 JUSTIFICATION TUBE END PLAY



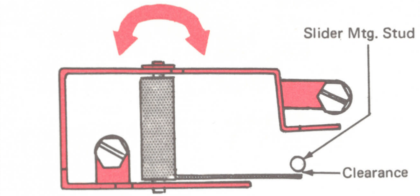
280 JUSTIFICATION TUBE RATCHET



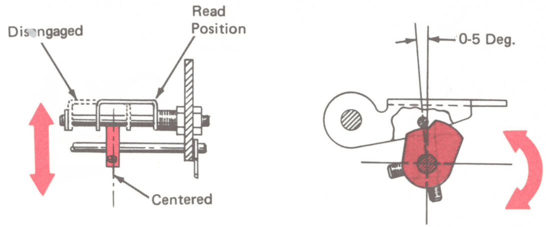
281 STEP DOWN BRACKET



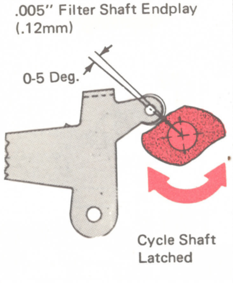
282 JUSTIFICATION BRACKET



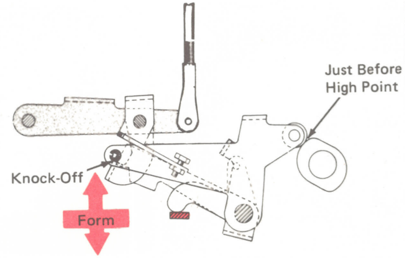
283 MODE SELECTOR CAM



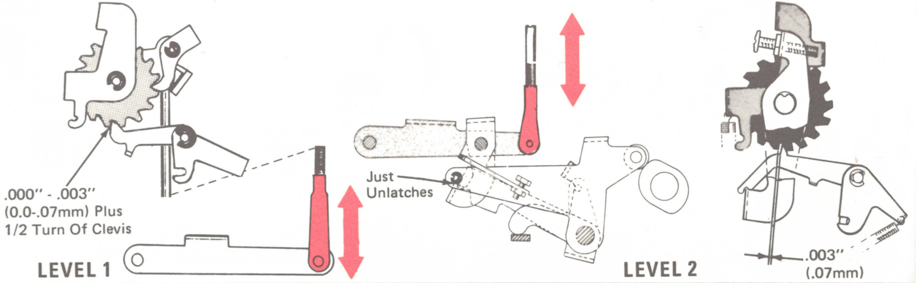
284 JUSTIFICATION CAM



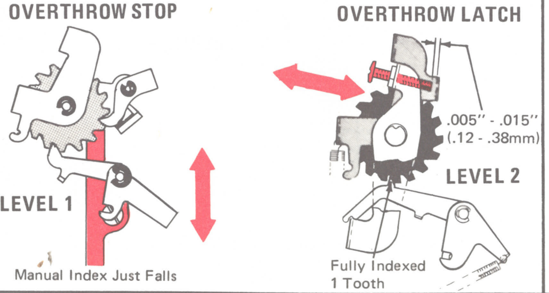
285 JUSTIFICATION MODE LATCH STOP



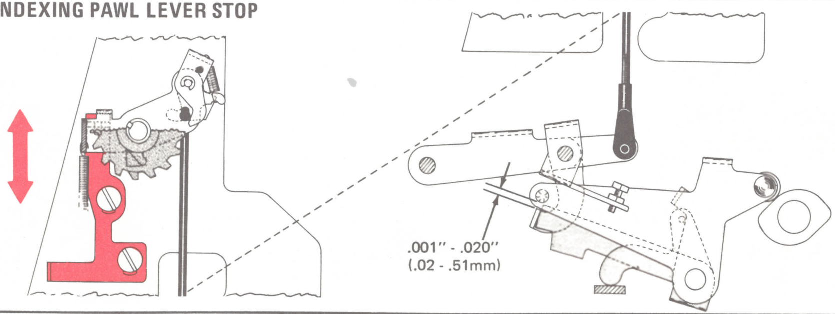
286 INDEXING LINK



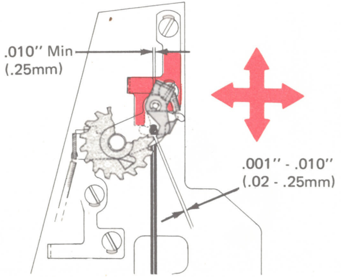
287 INDEXING PAWL OVERTHROW STOP



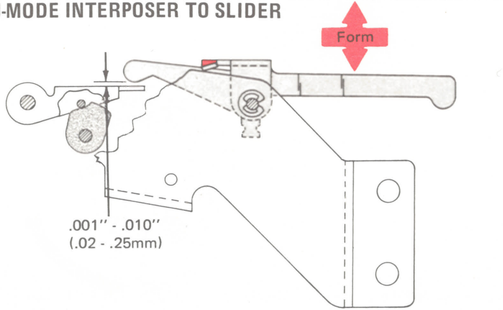
288 INDEXING PAWL LEVER STOP



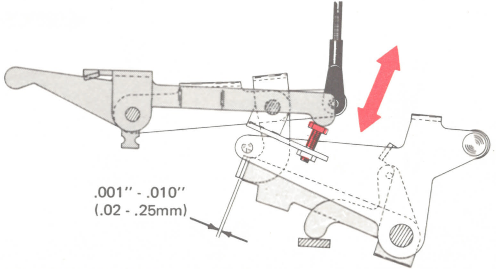
289 INDEXING PAWL STOP



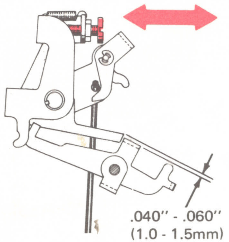
290 J-MODE INTERPOSER TO SLIDER



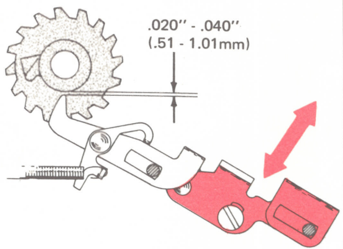
291 J-MODE LEVER SCREW



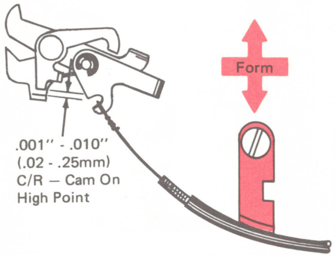
292 REBOUND CHECK LATCH BITE



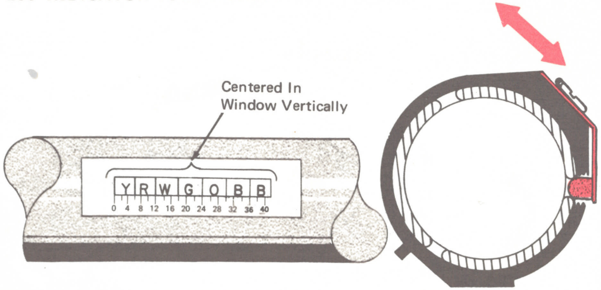
293 HOMING PAWL BITE



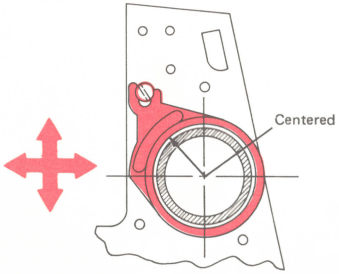
294 UNLATCH PAWL CABLE



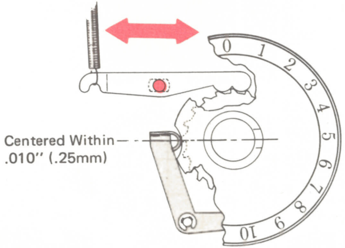
295 INDICATOR TUBE DETENT



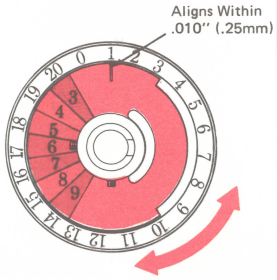
296 SPACEBAR INDICATOR SHIELD



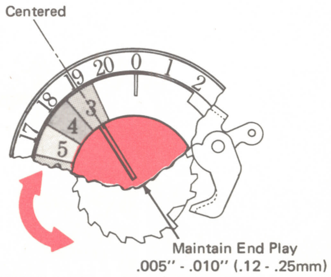
297 RATCHET DETENT STUD



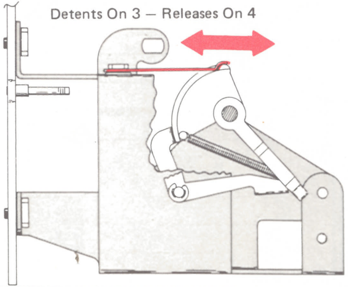
298 SPACEBAR SELECTOR PLATE



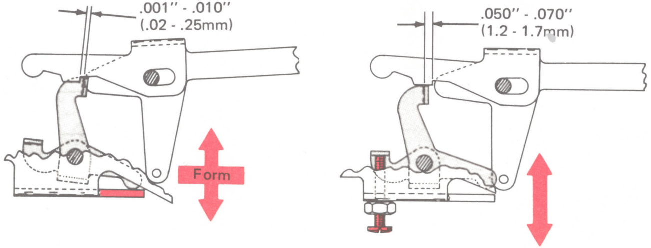
299 SPACEBAR VALVE RATCHET



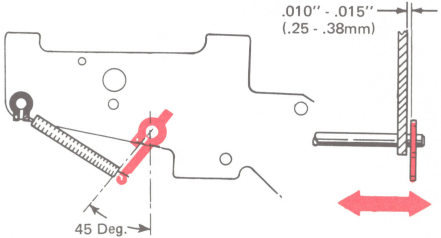
300 J-LEVER CAM DETENT SPRING



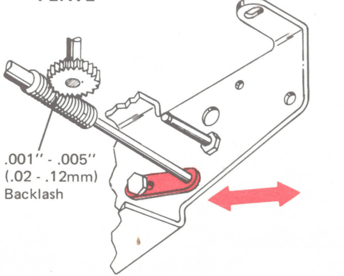
301 STEPPING LATCH



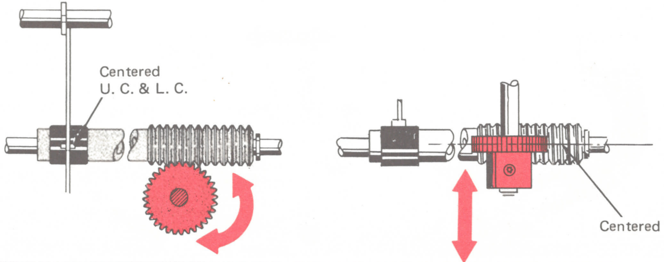
302 SPACEBAR VALVE SHAFT CLIP



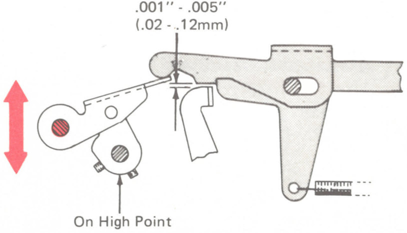
303 SPACEBAR VALVE SHAFT GUIDE PLATE



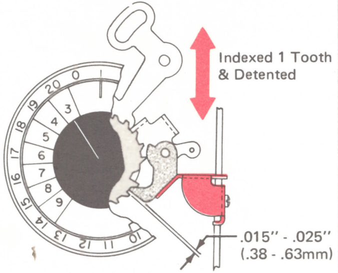
304 SPACEBAR VALVE DIAL PINION GEAR



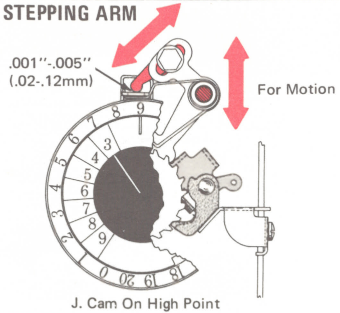
305 SLIDER MOUNTING STUD



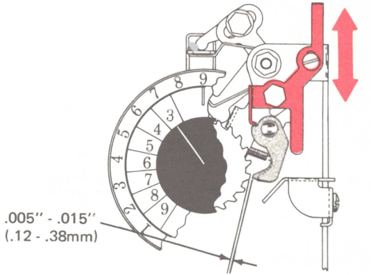
306 STEPPING PAWL OVERTHROW STOP



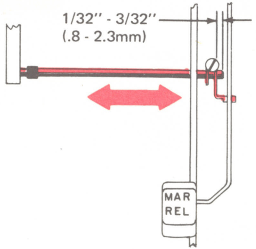
307 STEPPING ARM



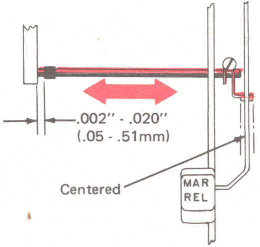
308 PAWL DISENGAGE ARM



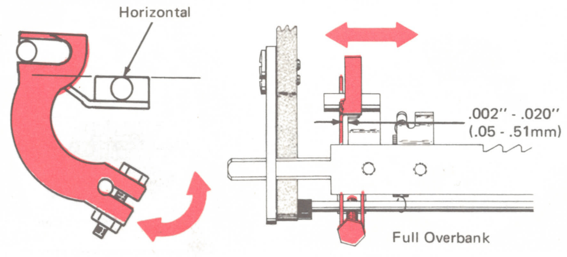
309 MARGIN RELEASE LEVER SHAFT



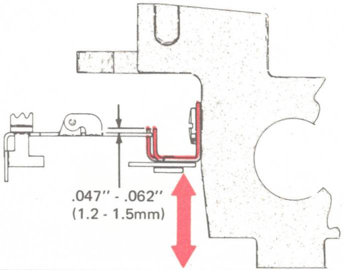
310 MARGIN RELEASE LEVER



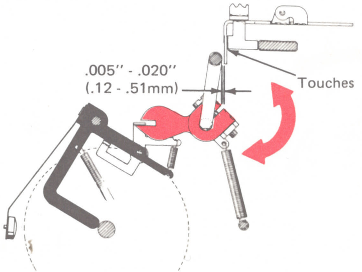
311 RIGHT HAND MARGIN RELEASE LEVER



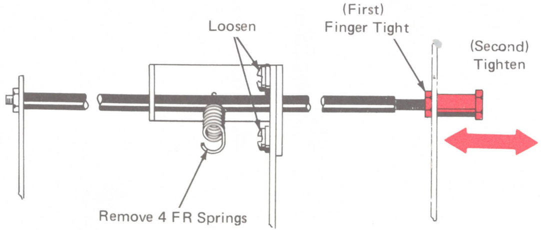
312 LINELOCK BRACKET



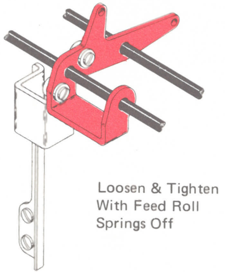
313 BELLRINGER BAIL LEVER



314 SIZE THE CARRIAGE

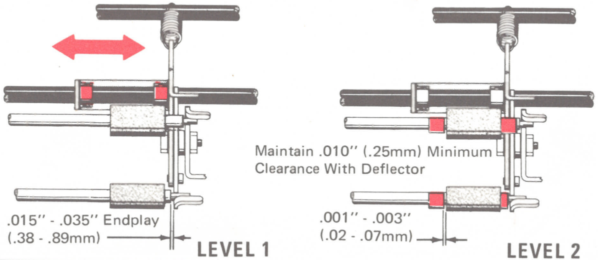


315 CENTER PAPER FEED MOUNTING ARM



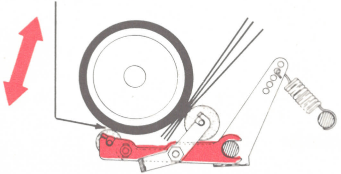
Loosen & Tighten
With Feed Roll
Springs Off

316 FEED ROLL END PLAY



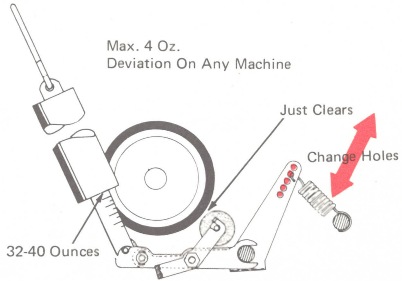
Maintain .010" (.25mm) Minimum
Clearance With Deflector

317 FEED ROLL ARMS



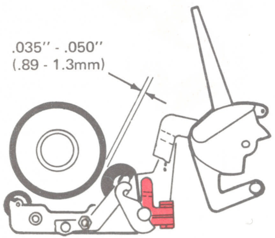
Touches With 3 Tab Cards
Clears With 4 Tab Cards

318 FEED ROLL TENSION

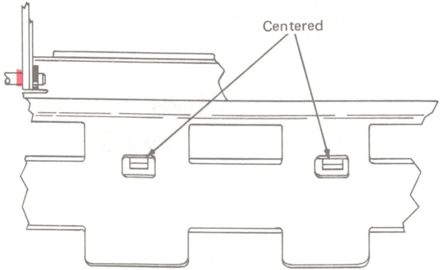


Max. 4 Oz.
Deviation On Any Machine

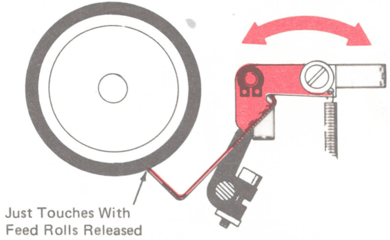
319 FEED ROLL RELEASE LEVERS



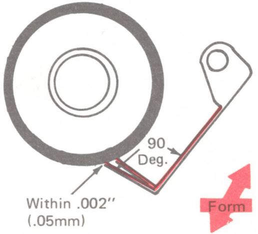
320 PAPER STACKERS FINGERS – LATERAL



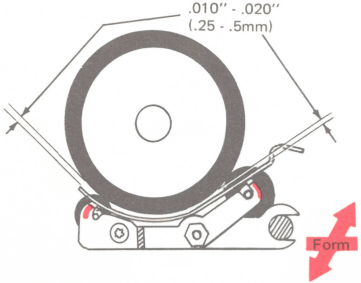
PAPER STACKER



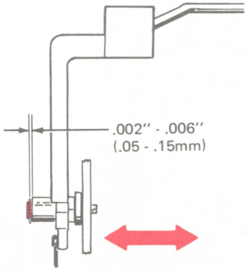
DEFLECTOR TO STACKER FINGER CLEARANCE



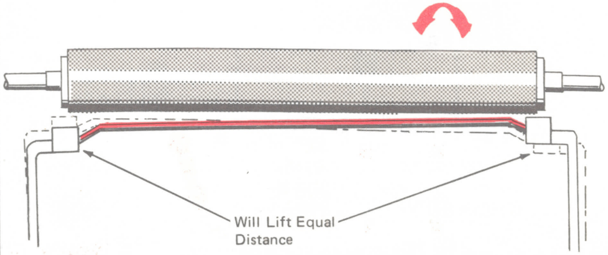
321 DEFLECTOR CLEARANCE



322 PAPER BAIL END PLAY

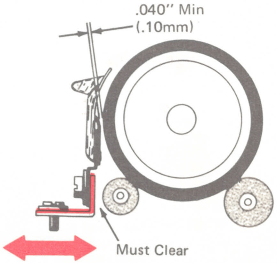


323 PAPER BAIL SHAFT

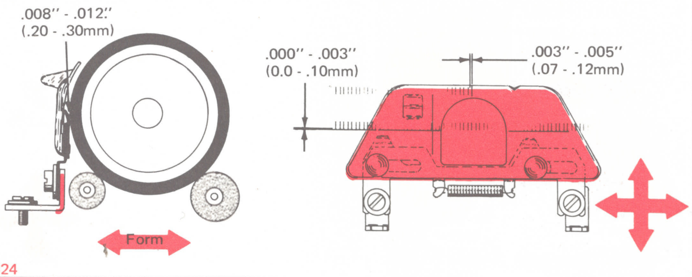


LEVEL 1

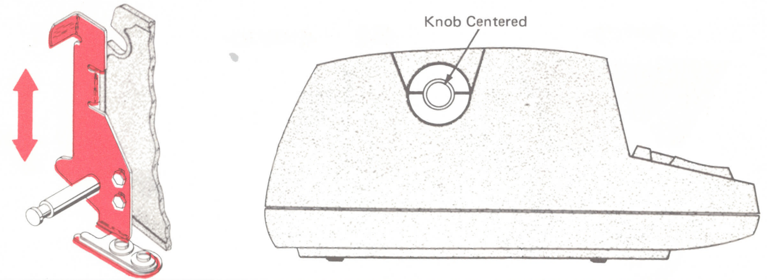
324 CARDHOLDER BRKT. ASM.



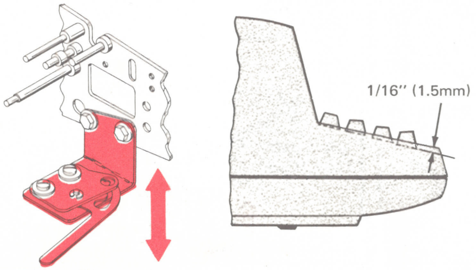
325 CARDHOLDER BRACKET ASSEMBLY



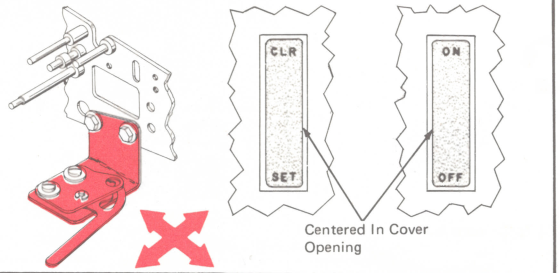
326 REAR MOUNTING BRACKETS



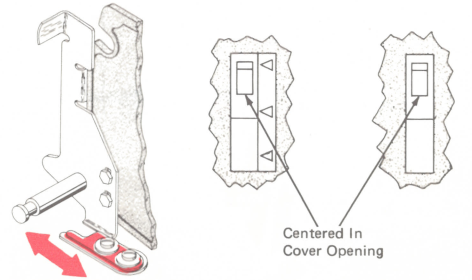
327 FRONT MOUNTING BRACKETS



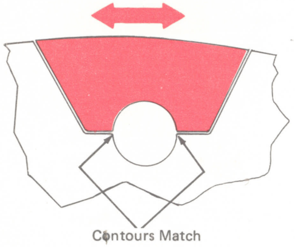
328 FRONT MOUNTING BRACKET POSITIONING PLATES



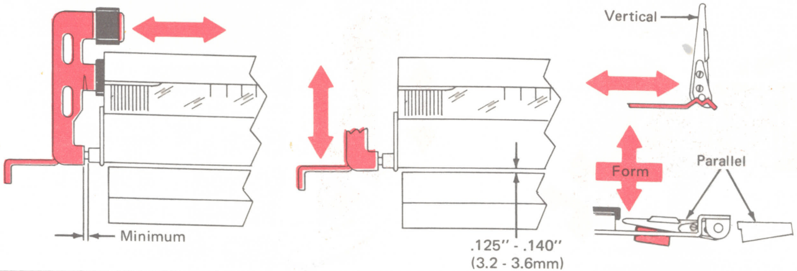
329 REAR MOUNTING BRACKET POSITIONING PLATES



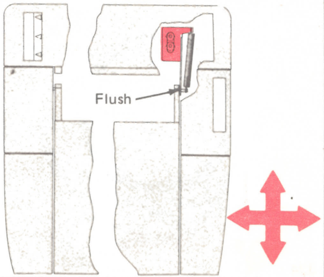
330 PLATEN SADDLE HINGE BRACKETS



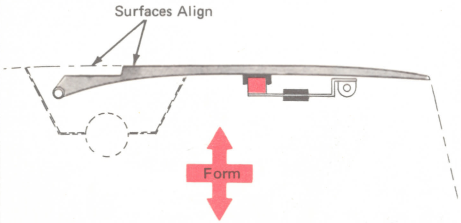
331 CARRIER RETURN INTERLOCK GUARD



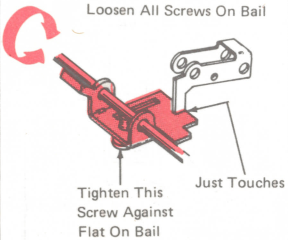
332 TOP COVER HINGE BRACKET



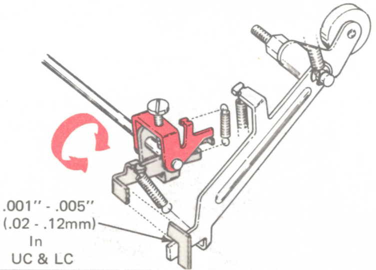
333 TOP COVER STOP



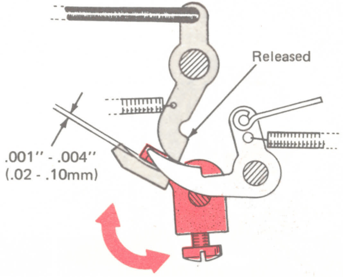
334 INTERLOCK BAIL


Loosen All Screws On Bail
Tighten This Screw Against Flat On Bail
Just Touches

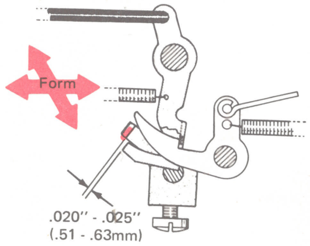
335 SHIFT INTERLOCK BAIL BELLCRANK



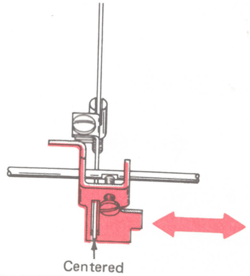
336 PRINT INTERLOCK BELLCRANK



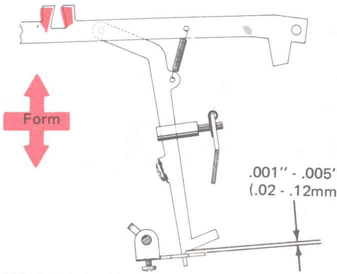
337 CYCLE CLUTCH INTERLOCK PAWL



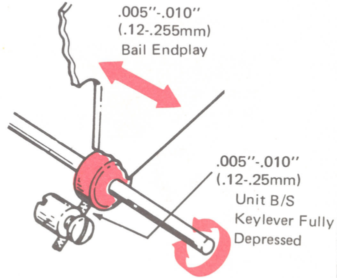
338 CYCLE CLUTCH INTERLOCK



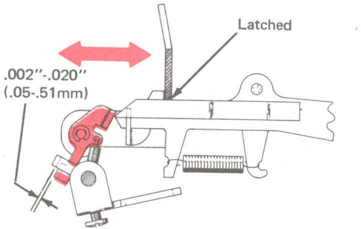
339 BACKSPACE INTERLOCK



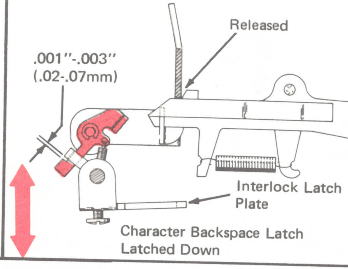
340 BACKSPACE INTERLOCK



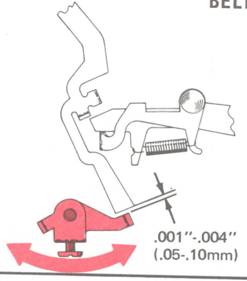
341 BACKSPACE INTERLOCK LATCH



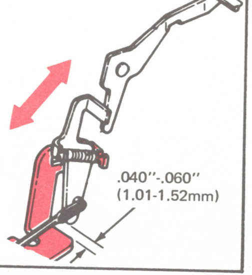
342 BACKSPACE INTERLOCK LATCH



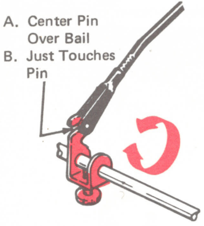
343 CARRIER RETURN INTERLOCK BELLCRANK



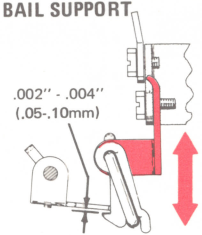
344 CARRIER RETURN TO PRINT INTERLOCK



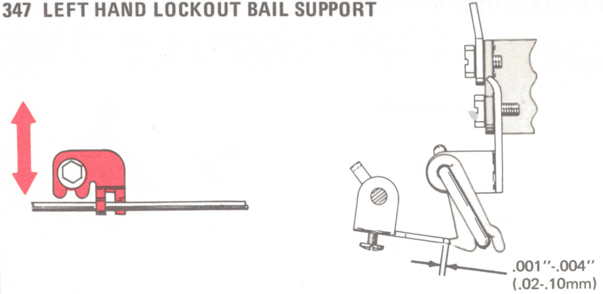
345 CARRIER RETURN TO PRINT INTERLOCK



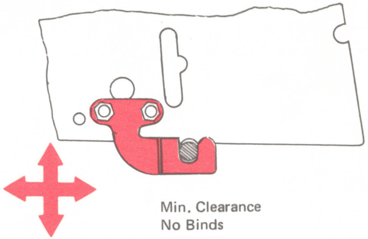
346 RIGHT HAND LOCKOUT BAIL SUPPORT



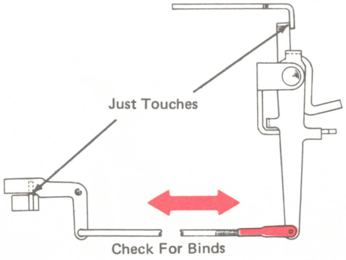
347 LEFT HAND LOCKOUT BAIL SUPPORT



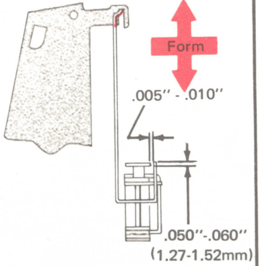
348 INTERLOCK BAIL SUPPORT



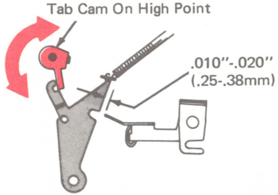
349 BACKSPACE OVERBANK INTERLOCK



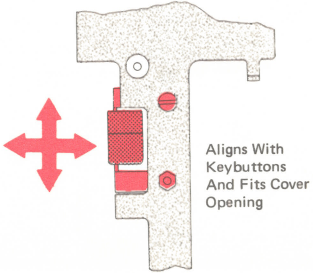
350 SAFETY INTERLOCK



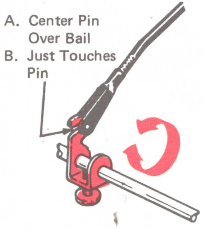
351 TAB/CARRIER RETURN INTERLOCK



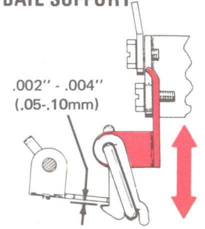
352 DKD BRACKET POSITION



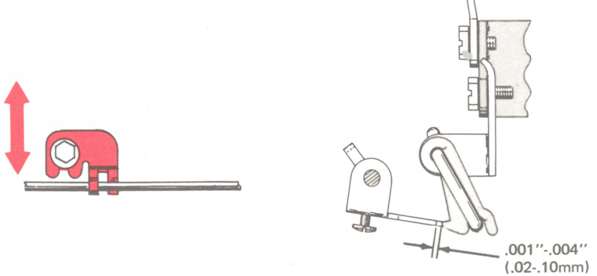
345 CARRIER RETURN TO PRINT INTERLOCK



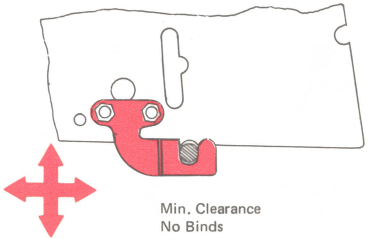
346 RIGHT HAND LOCKOUT BAIL SUPPORT



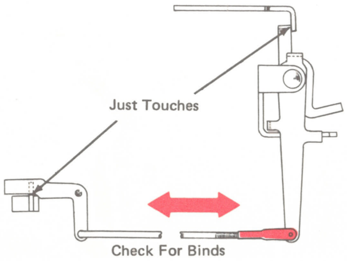
347 LEFT HAND LOCKOUT BAIL SUPPORT



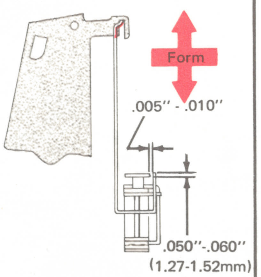
348 INTERLOCK BAIL SUPPORT



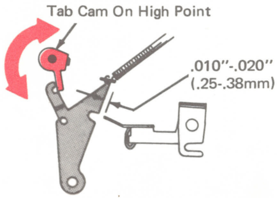
349 BACKSPACE OVERBANK INTERLOCK



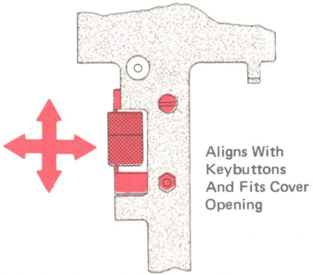
350 SAFETY INTERLOCK



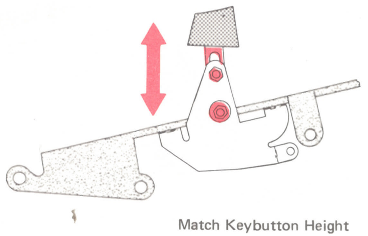
351 TAB/CARRIER RETURN INTERLOCK



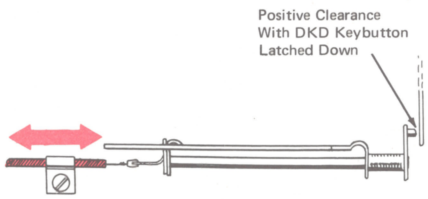
352 DKD BRACKET POSITION



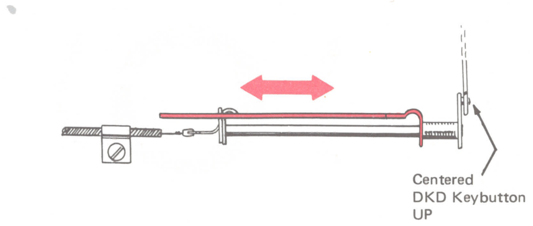
353 DKD BRACKET HEIGHT



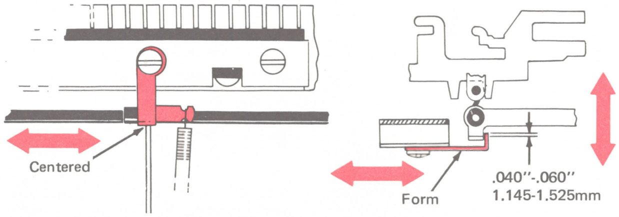
354 DKD CABLE SHEATH



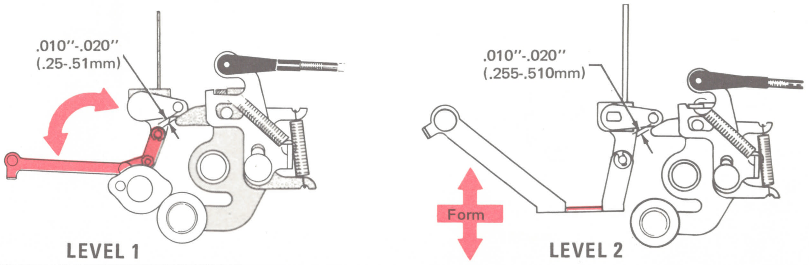
355 DKD BRACKET



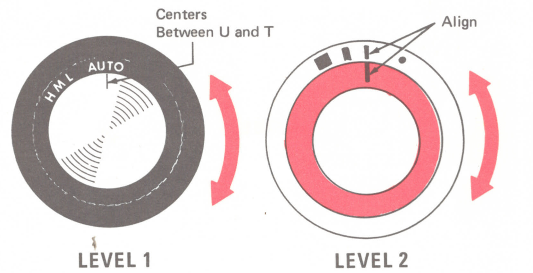
356 DISCONNECT LINK STOP



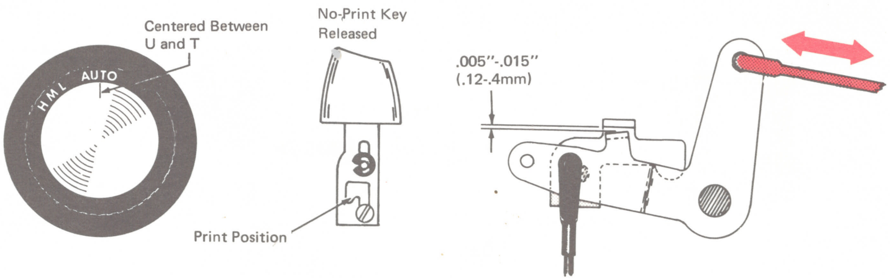
357 ESCAPEMENT DISCONNECT LINK



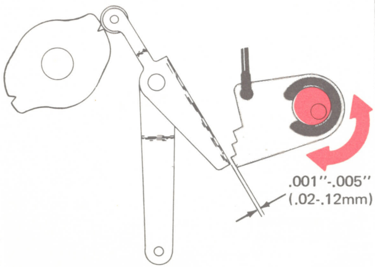
358 MVD STUD



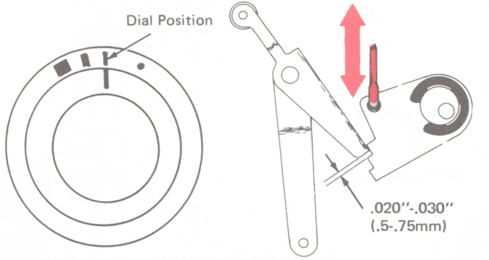
359 MANUAL VELOCITY BELLCRANK LINK



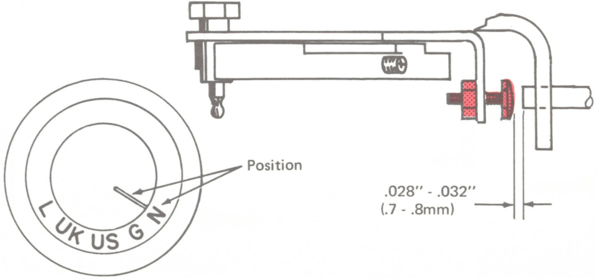
360 MANUAL VELOCITY STOP ECCENTRIC



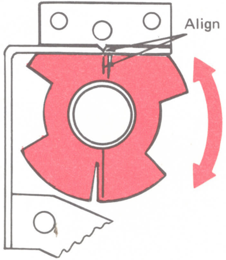
361 MANUAL VELOCITY STOP LINK



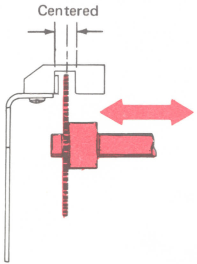
362 AVC ADJUSTING SCREW



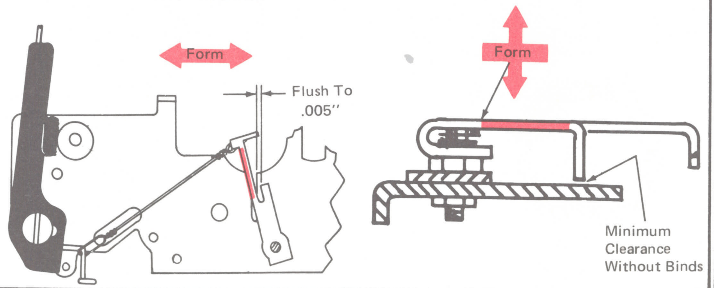
363 TIMING WHEEL



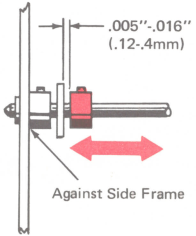
364 INTERLOCK WHEEL



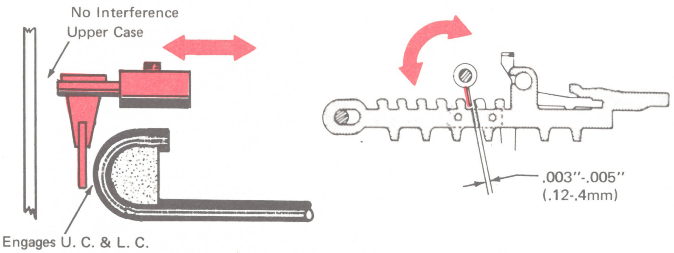
365 RIBBON FEED INTERPOSER



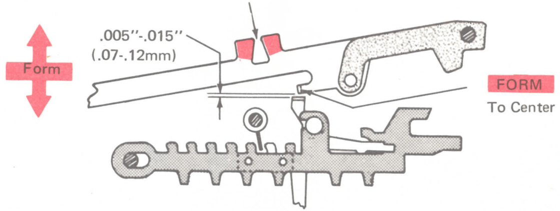
366 INTERPOSER SIDE PLAY



367 BAIL FLAG

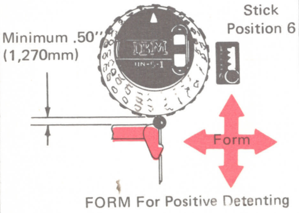


368 KEYLEVER TO LATCH PAWL CLEARANCE



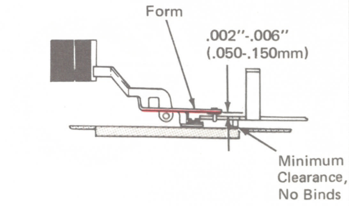
369 LOAD LEVER DETENT

Adjust To Detent Load Lever To Rear As Far As Possible

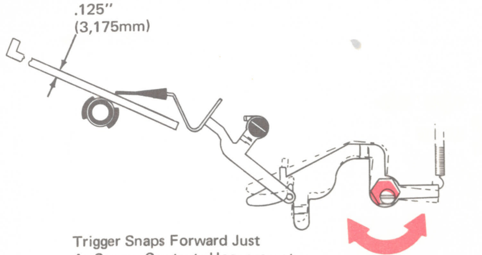


FORM For Positive Detenting

370 SENSOR ADJUSTMENT

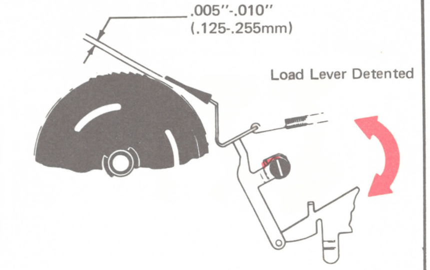


371 TRIGGER ECCENTRIC

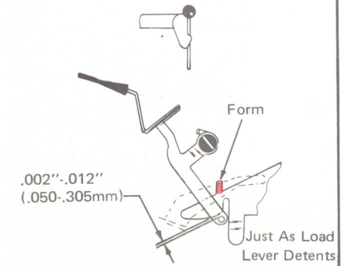


Trigger Snaps Forward Just As Sensor Contacts Hooverometer

372 SENSOR STOP WASHER

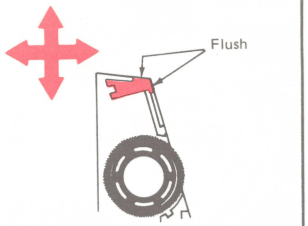


373 SENSOR RELEASE LUG

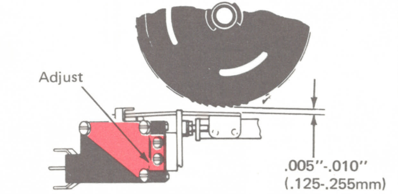


Just As Load Lever Detents

374 CARRIER POSITION SCALE

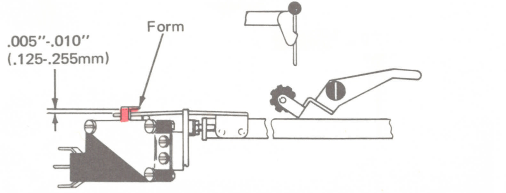


375 END OF RIBBON SWITCH



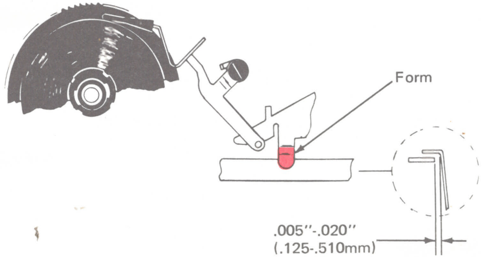
Switch Just Opens

376 SWITCH BRACKET LUG



Just As Switch Opens

377 BAIL OPERATING LUG



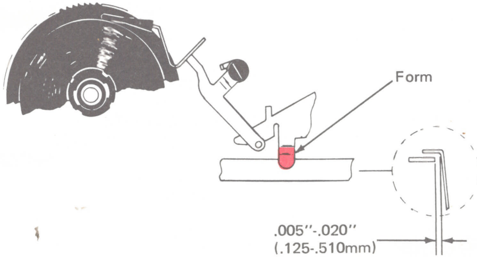
378 RELIABILITY CHECK

NOTE: After completing the preceding adjustments, check the following:

a. The trigger MUST RELIABLY cause the EOR switch to close as the sensor is slowly moved to the end-of-ribbon position.

b. The sensor MUST RELIABLY restore to its open position just as the ribbon load lever is detented to the rear (to enable ribbon installation).

377 BAIL OPERATING LUG



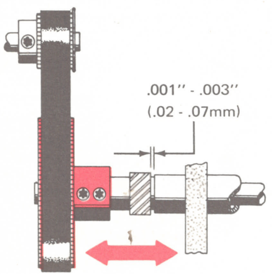
378 RELIABILITY CHECK

NOTE: After completing the preceding adjustments, check the following:

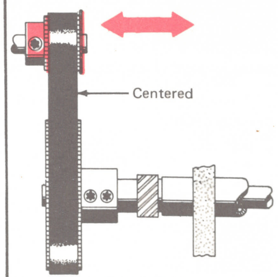
a. The trigger MUST RELIABLY cause the EOR switch to close as the sensor is slowly moved to the end-of-ribbon position.

b. The sensor MUST RELIABLY restore to its open position just as the ribbon load lever is detented to the rear (to enable ribbon installation).

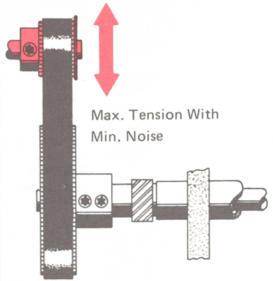
1 DRIVE SHAFT END PLAY



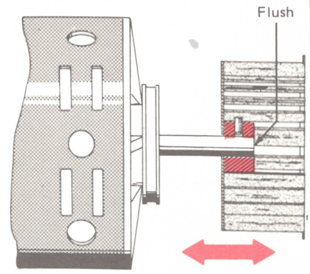
2 BELT TRACKING



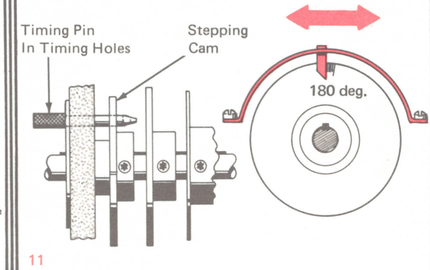
3 BELT TENSION



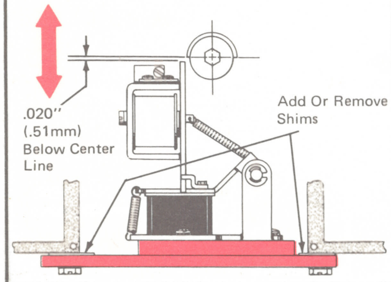
4 FAN BLADE



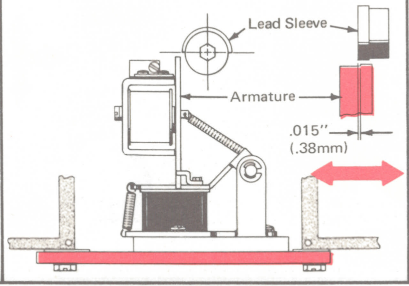
5 POINTER BRACKET



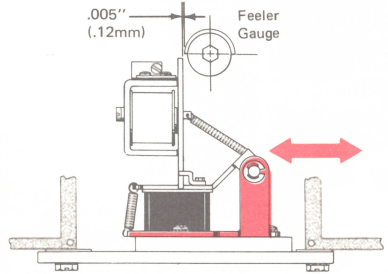
6 CYCLE CLUTCH ARMATURE HEIGHT



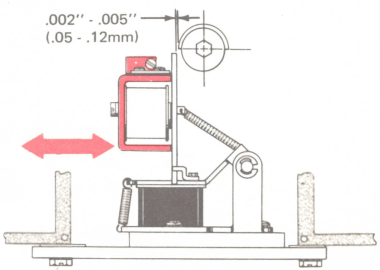
7 ARMATURE FRONT-TO-REAR



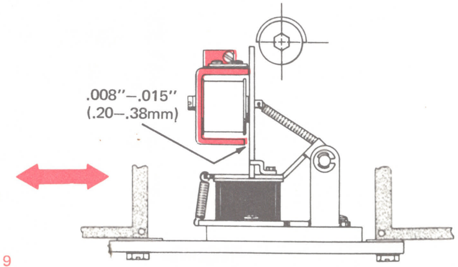
8 ARMATURE VERTICAL



9 CYCLE CLUTCH MAGNET POSITION

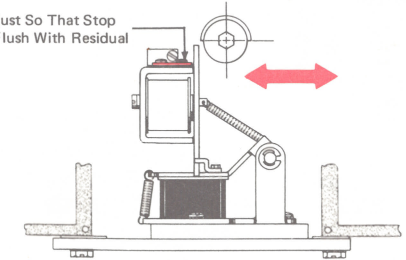


10 ARMATURE YOKE CLEARANCE

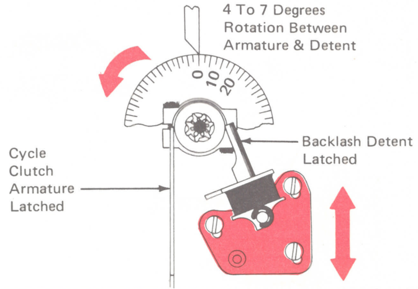


11 CYCLE CLUTCH MAGNET STOP

Adjust So That Stop Is Flush With Residual

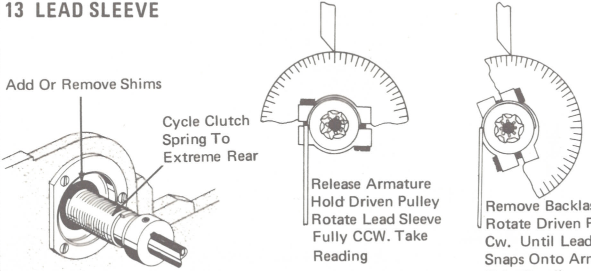


12 BACKLASH DETENT



4 To 7 Degrees Rotation Between Armature & Detent

13 LEAD SLEEVE

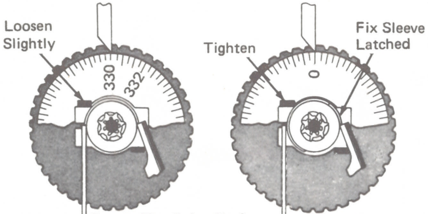


Release Armature Hold Driven Pulley Rotate Lead Sleeve Fully CCW. Take Reading

Remove Backlash Detent Rotate Driven Pulley Cw. Until Lead Sleeve Snaps Onto Armature Take Reading

Add Or Remove Shims So That The Difference Is From 40 deg. - 80 deg.

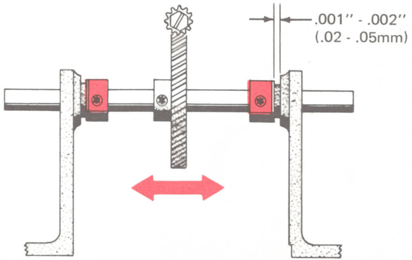
14 CYCLE CLUTCH SPRING SLIP POINT



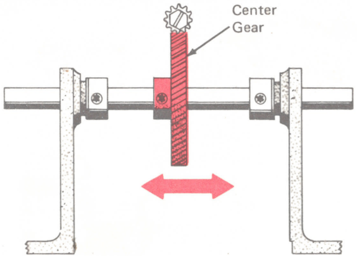
Rotate The Drive Shaft To 330 deg – 335 deg

Release Armature And Rotate Driven Pulley to 0 deg

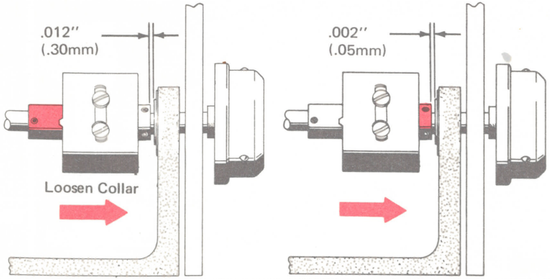
15 REWIND SHAFT POSITION



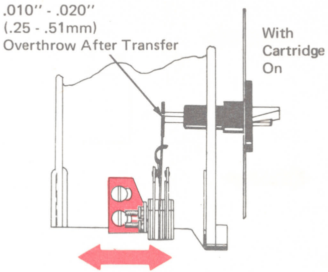
16 HELICAL GEAR POSITION



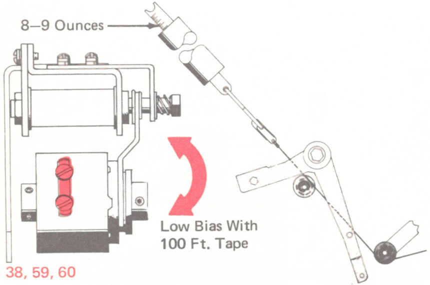
17 BIAS CLUTCH ARBOR CLEARANCE



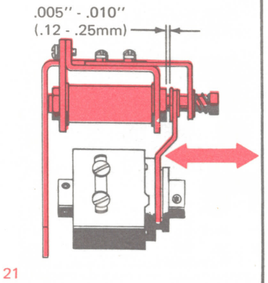
18 CARTRIDGE INTERLOCK



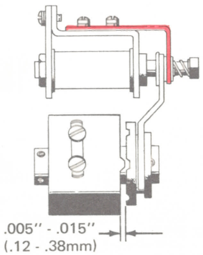
19 LOW BIAS



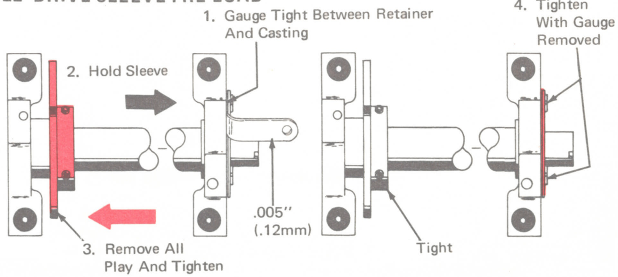
20 BIAS SOLENOID POSITION



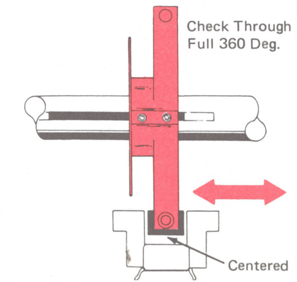
21 BIAS SOLENOID BACKSTOP



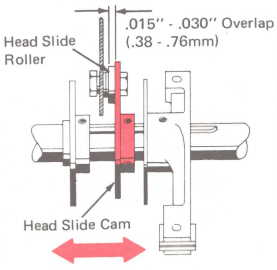
22 DRIVE SLEEVE PRE-LOAD



23 EMITTER ARM

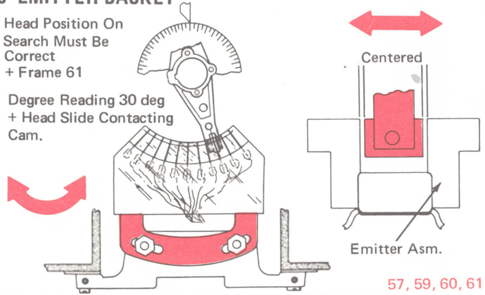


24 HEADSLIDE CAM



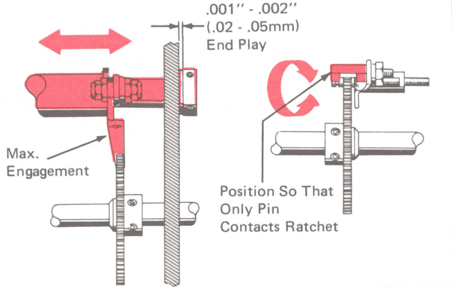
25 EMITTER BASKET

1. Head Position On Search Must Be Correct + Frame 61
2. Degree Reading 30 deg + Head Slide Contacting Cam.

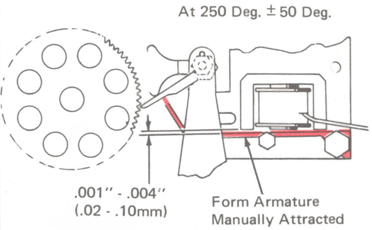


57, 59, 60, 61

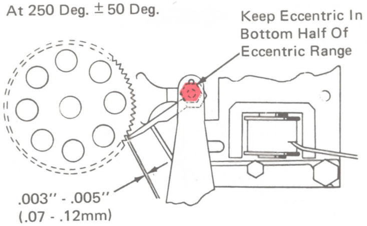
26 STEPPING SHAFT ENDPLAY



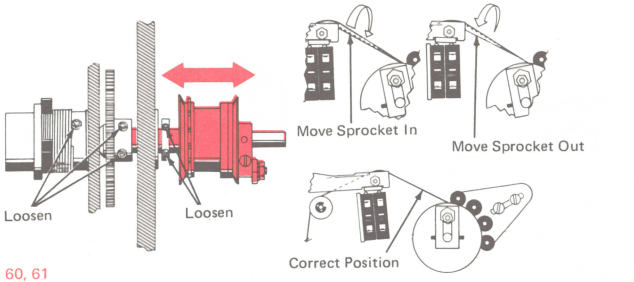
27 STEPPING MAGNET ARMATURE



28 FORESTEPPING FINGER ECCENTRIC

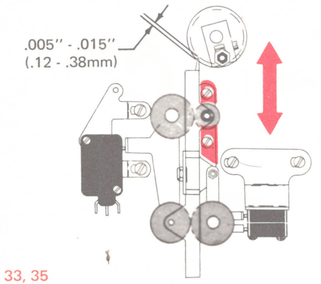


29 SPROCKET ASSEMBLY

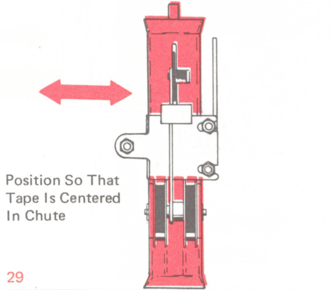


44, 59, 60, 61

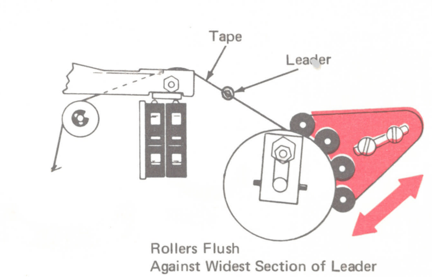
30 TAPE CHUTE



31 TAPE CHUTE LEFT-TO-RIGHT

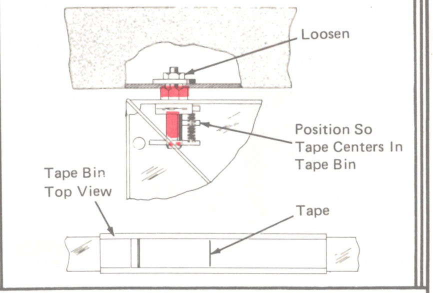

Position So That Tape Is Centered In Chute

32 TAPE GUIDE ROLLER BRACKET



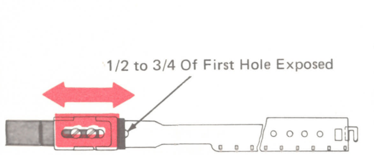
Rollers Flush Against Widest Section of Leader

33 TAPE BIN LOCATING STUD

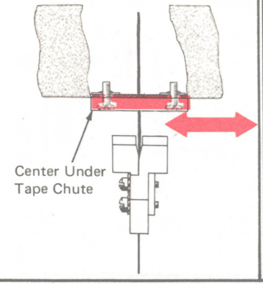


Position So Tape Centers In Tape Bin

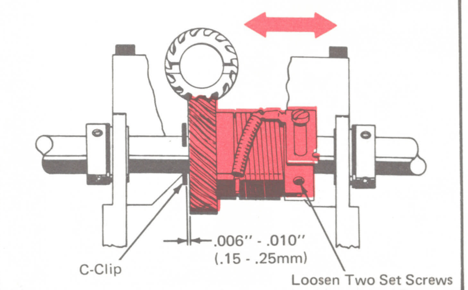
34 LEADER STOP


1/2 to 3/4 Of First Hole Exposed

35 NYLON STOP

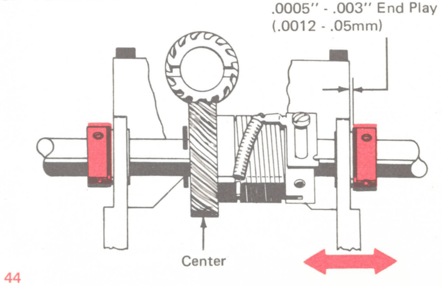

Center Under Tape Chute

36 TORQUE LIMITER ARBOR

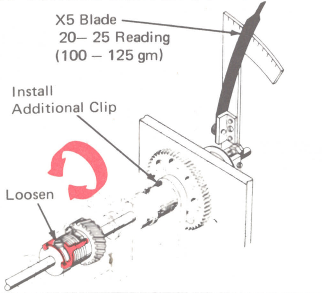


Loosen Two Set Screws

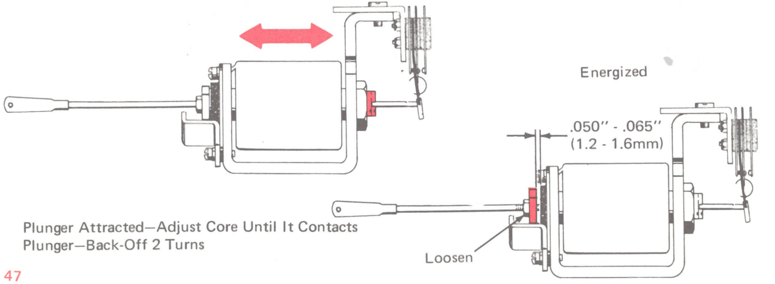
37 TORQUE LIMITER SHAFT



38 TORQUE LIMITER OUTPUT

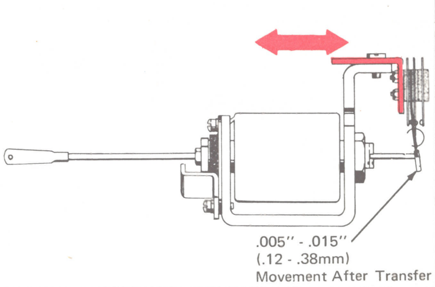


39 DETENT SOLENOID PLUNGER

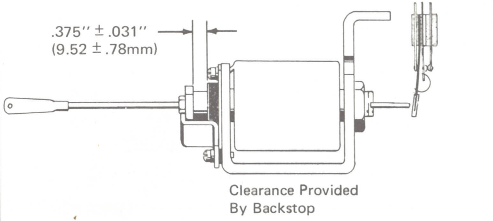


Plunger Attracted—Adjust Core Until It Contacts Plunger—Back-Off 2 Turns

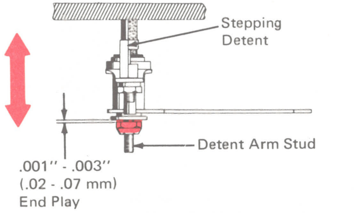
40 DETENT OUT CONTACTS



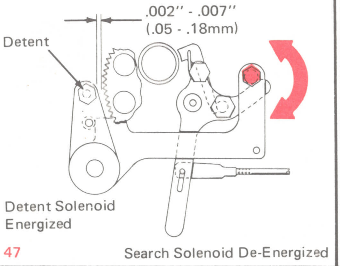
41 DETENT SOLENOID BACKSTOP



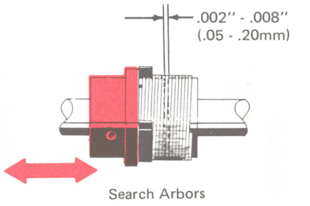
42 DETENT LEVER



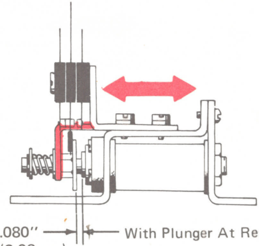
43 DETENT ACTUATING LEVER



44 SEARCH ARBORS



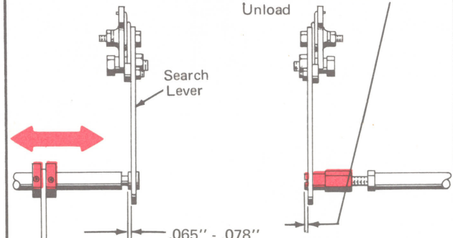
45 SEARCH SOLENOID BACKSTOP



.080" (2.03mm) With Plunger At Rest

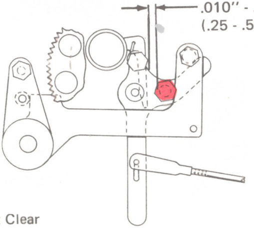
46 LOAD SEARCH SHAFT

.065" - .078" (1.65 - 1.98mm) Overlap In Rewind Or Unload



.065" - .078" (1.65 - 1.98mm)

47 SEARCH SHOE CLEARANCE



.010" - .020" (.25 - .51mm)

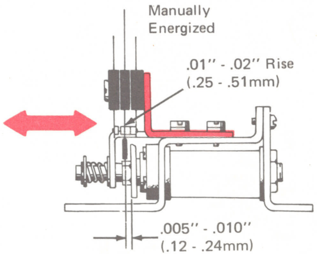
During Search

Shoe Must Clear Spring On Unload Or Rewind

48 LOAD SEARCH CONTACTS

Manually Energized

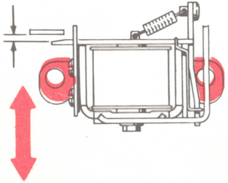
.01" - .02" Rise (.25 - .51mm)



.005" - .010" (.12 - .24mm)

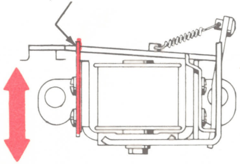
49 SEARCH POSITION MAGNET

.005" - .010" With Magnet Energized (.12 - .25mm)

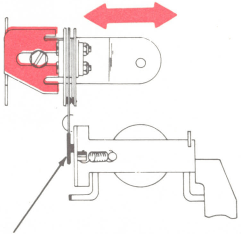


50 SEARCH POSITION MAGNET UPSTOP

Flush To .005" Above (0 - .12mm)

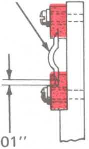


51 SEARCH POSITION MAGNET CONTACTS



.010" - .020" Overthrow After Transfer (.25 - .51mm)

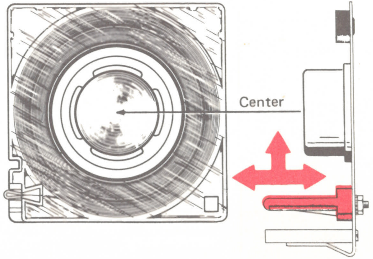
52 HEADSLIDE BEARINGS



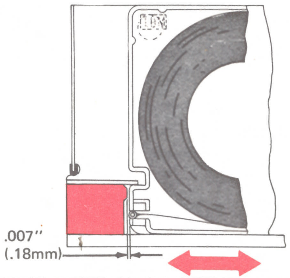
.001" (.02mm)

50, 57

53 CARTRIDGE LOCATOR PIN

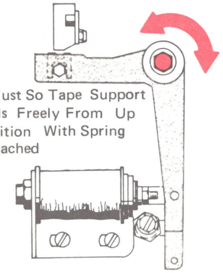


54 STATION BLOCK



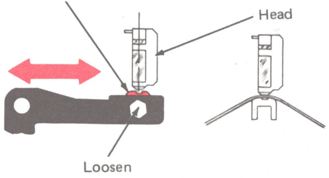
55 TAPE SUPPORT PIVOT

Adjust So Tape Support Falls Freely From Up Position With Spring Attached



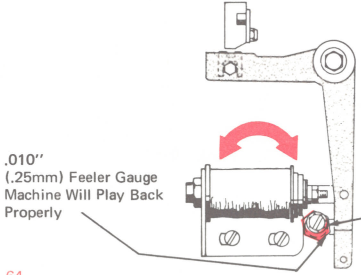
56 TAPE BED

Center Tape Bed ± .010"
Adjust Height So Head Is Parallel To Bed To Within .001"



59, 60

57 HEAD TO TAPE



.010" (.25mm) Feeler Gauge Machine Will Play Back Properly

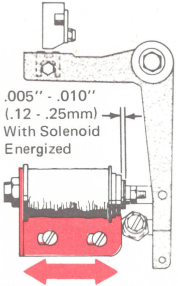
.014" (.35mm) Feeler Gauge Here Machine Intermittently Fails In PB

Ecc. In Lower Half Of Its Orbit

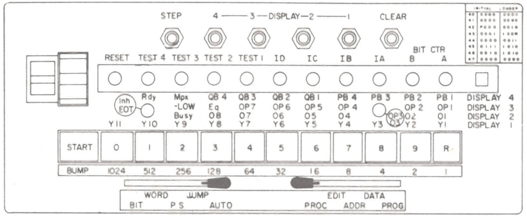
64

58 TAPE SUPPORT SOLENOID

.005" - .010" (.12 - .25mm) With Solenoid Energized



59 HEAD ALIGNMENT "ALONG"



CONTROL PANEL – C E CONTROLS

Section "A" Of Master Tape

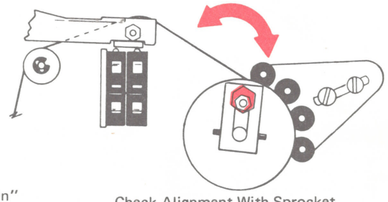
Adj. Sprocket Eccentric For Continuous 16 & 64 Bit

Byte	Key
0	7
1	67R
2	37
3	69R

Third Tape Recorder – Along "Ready" And E.O.T. Light "On" "C" Light "Off".

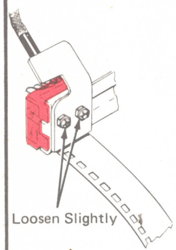
Note: Continuous No-Bit (With Good Tape & Reading At Sprocket Hole) Is Acceptable.

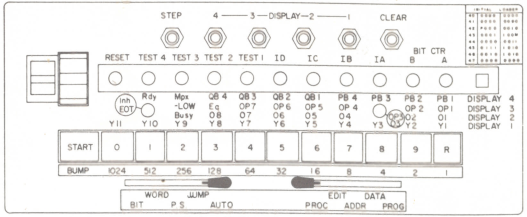
To Align Left Station Change Byte 1 Data To 678R.



Check Alignment With Sprocket Turned To This Position Against Bias.

60 HEAD ALIGNMENT "ACROSS"





CONTROL PANEL – C E CONTROLS

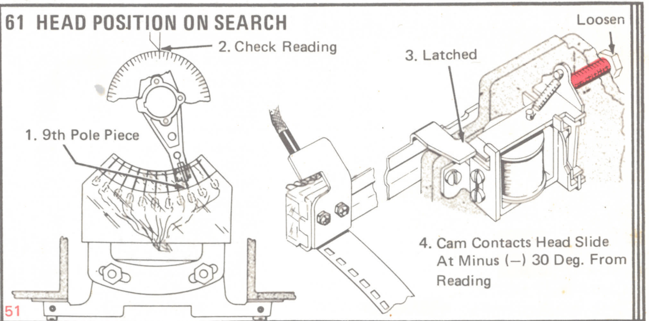
Section "B" Of Master Tape

Adj. Head For
Continuous 128 Bit

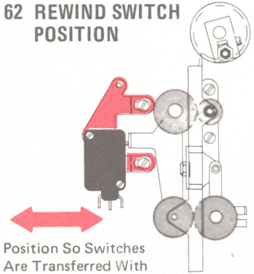
Note: Machine tolerances may be such that the 128, 4 and 1 bit position lights occur simultaneously. If all three lights are "ON", the alignment is acceptable.

Third Tape Recorder Across
Ready & EOT Light "OFF"
"C" Light "ON"

61 HEAD POSITION ON SEARCH


Loosen
2. Check Reading
3. Latched
1. 9th Pole Piece
4. Cam Contacts Head Slide At Minus (—) 30 Deg. From Reading
51

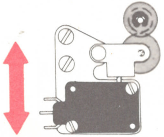
62 REWIND SWITCH POSITION



Position So Switches Are Transferred With .005" - .020" (.12 - .51mm) Overthrow With Tape Under Roller

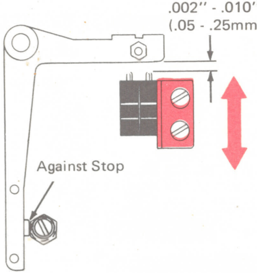
30

63 END OF TAPE

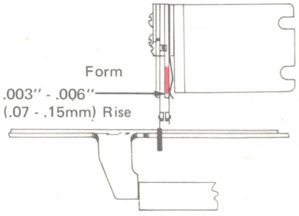


With Tape Under Roller Position For .015" - .025" (.38 - .63mm) Overthrow After Transfer

64 TAPE SUPPORT SWITCHES

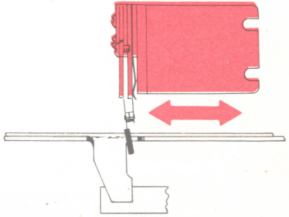


65 HOME POSITION CONTACT

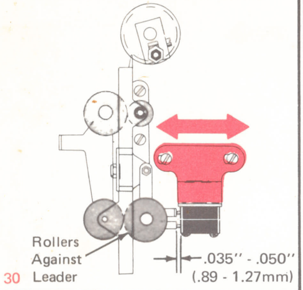


66 HOME POSITION CONTACT

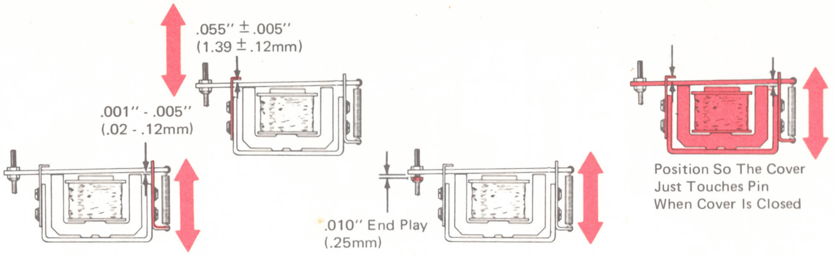
Break At 20 Deg. ± 5 Deg.
Remake At 340 Deg. ± 5 Deg.



67 LEADER SENSE SWITCHES



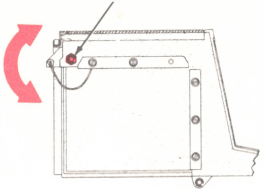
68 STATION COVER MAGNET



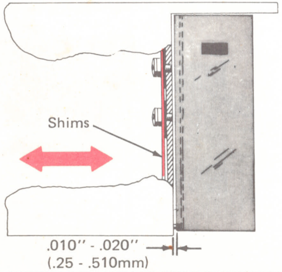
Position So The Cover
Just Touches Pin
When Cover Is Closed

69 TAPE STATION COVER ADJUSTING NUT

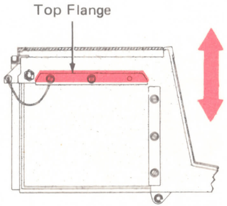
Adjust So That Lock Pin Enters
The Slot In The Cover



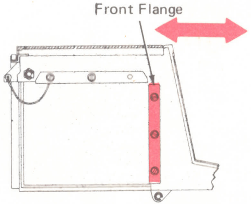
70 TAPE STATION COVER SHIMS



71 TAPE STATION COVER FLANGES

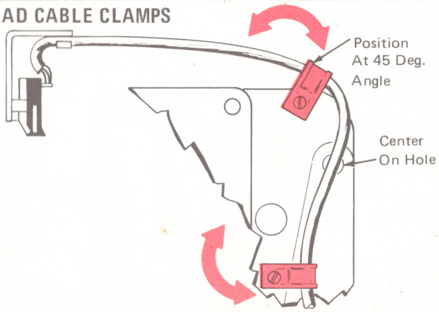


Minimum Clearance Between
Top Flange And Cover

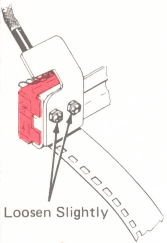


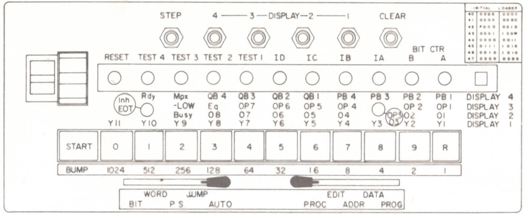
Minimum Between Front
Flange And Cover

72 HEAD CABLE CLAMPS



60 HEAD ALIGNMENT "ACROSS"





CONTROL PANEL — C E CONTROLS

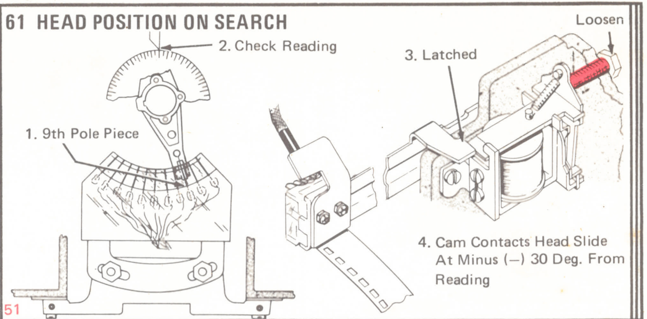
Section "B" Of Master Tape

Adj. Head For
Continuous 128 Bit

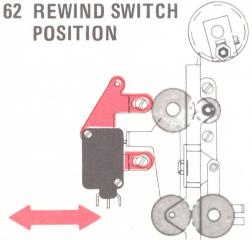
Note: Machine tolerances may be such that the 128, 4 and 1 bit position lights occur simultaneously. If all three lights are "ON", the alignment is acceptable.

Third Tape Recorder Across
Ready & EOT Light "OFF"
"C" Light "ON"

61 HEAD POSITION ON SEARCH

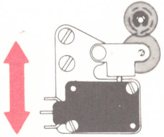


62 REWIND SWITCH POSITION



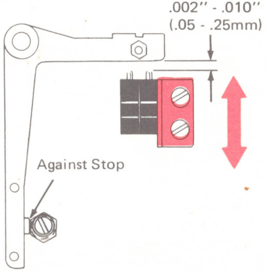
Position So Switches
Are Transferred With
.005" - .020" (.12 - .51mm)
Overthrow With Tape Under Roller

63 END OF TAPE

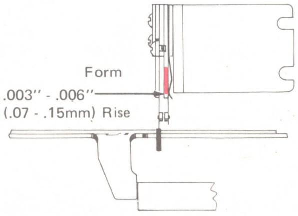


With Tape Under Roller Position
For .015" - .025" (.38 - .63mm)
Overthrow After Transfer

64 TAPE SUPPORT SWITCHES

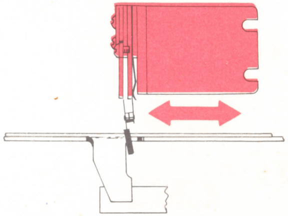


65 HOME POSITION CONTACT

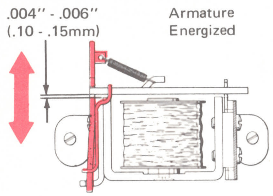


66 HOME POSITION CONTACT

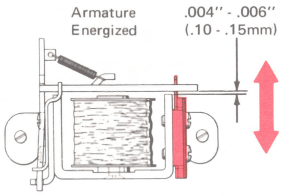
Break At 20 Deg. ± 5 Deg.
Remake At 340 Deg. ± 5 Deg.



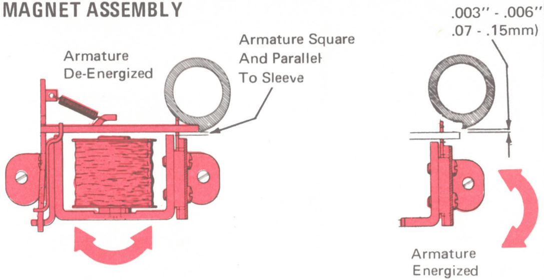
1 ARMATURE PIVOT PLATE



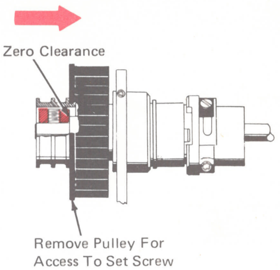
2 ARMATURE STOP



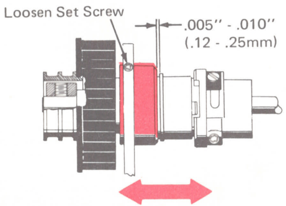
3 MAGNET ASSEMBLY



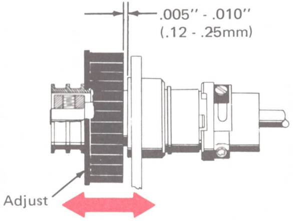
4 CYCLE SHAFT COLLAR



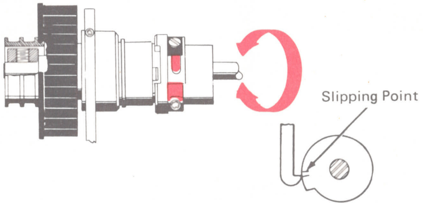
5 CYCLE SHAFT BEARING



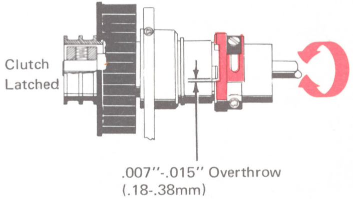
6 DRIVEN PULLEY



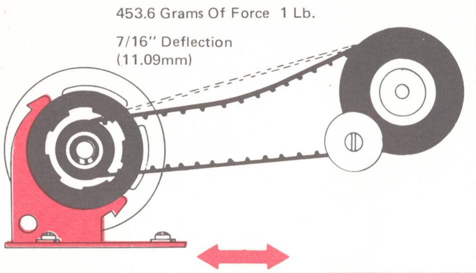
7 CYCLE CLUTCH SPRING



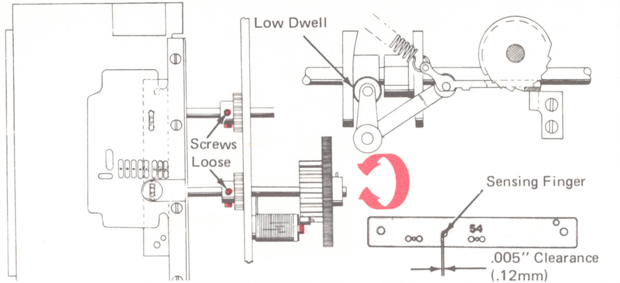
8 CLUTCH STOP COLLAR



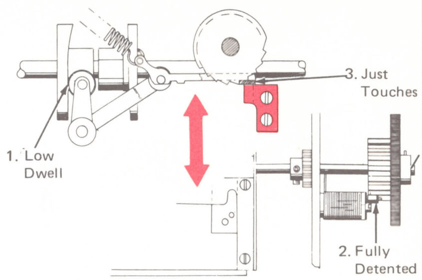
9 DRIVE BELT TENSION



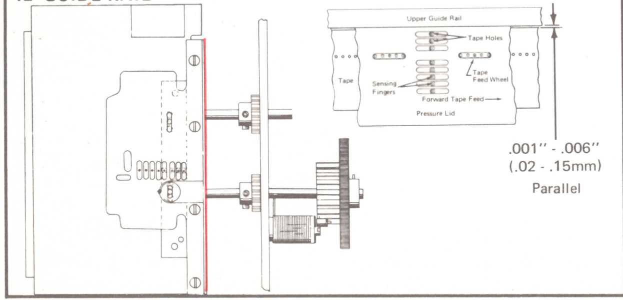
10 TAPE REGISTRATION



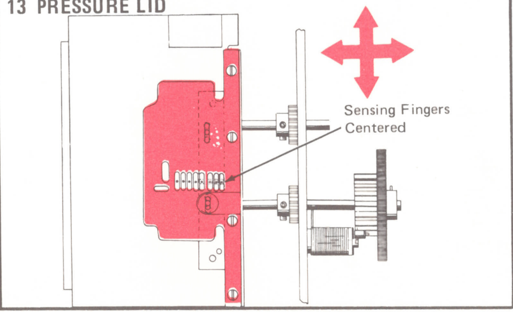
11 FORWARD STEPPING PAWL STOP BLOCK



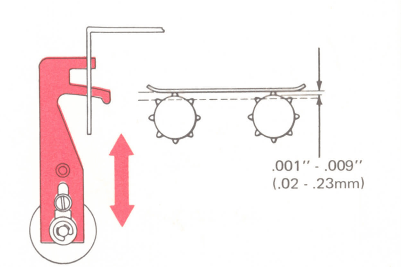
12 GUIDE RAIL



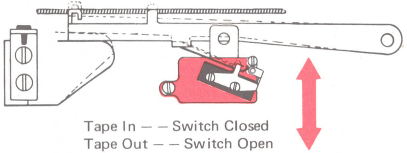
13 PRESSURE LID



14 TAPE TABLE

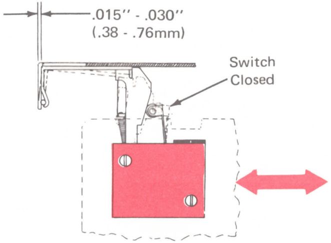


15 TAPE OUT LEVER & SWITCH

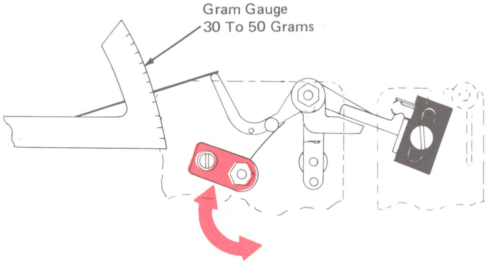


Tape In — — Switch Closed
Tape Out — — Switch Open

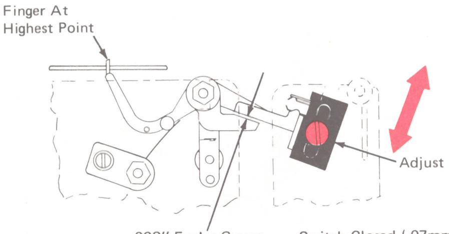
16 TAPE TENSION SWITCH



17 SENSING FINGER SPRING

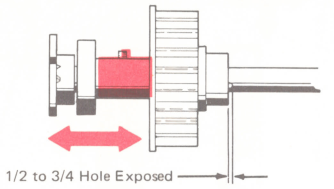


18 SENSING FINGER CONTACTS

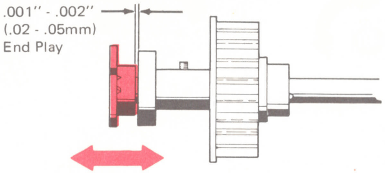


.003" Feeler Gauge — — Switch Closed (.07mm)
.008" Feeler Gauge — — Switch Open (.20mm)

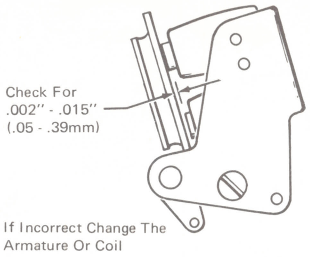
1 DRIVEN PULLEY POSITION



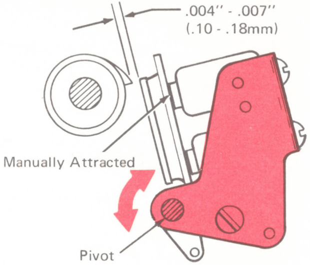
2 CYCLE SHAFT END PLAY



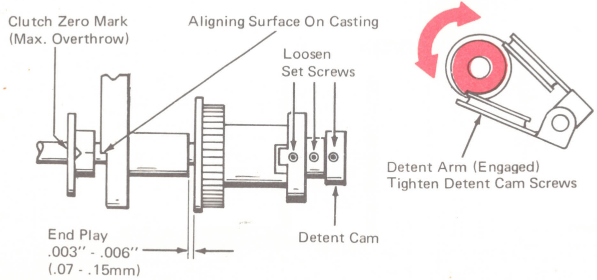
3 ARMATURE TO CORE CLEARANCE



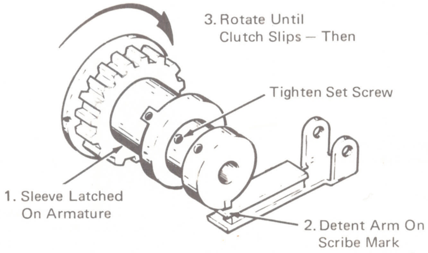
4 C. C. ARMATURE ASSEMBLY



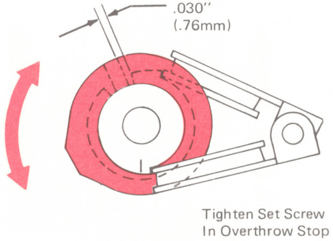
5 CLUTCH ZERO POSITION



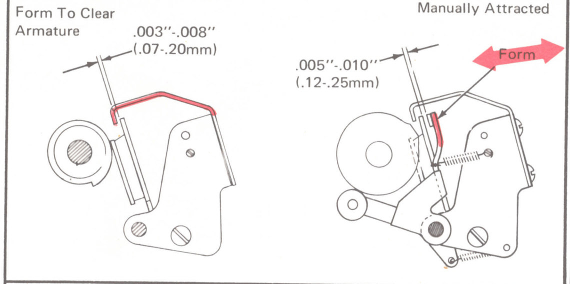
6 CYCLE CLUTCH DRIVE



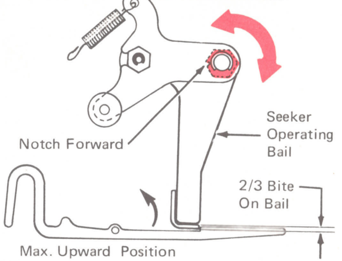
7 CYCLE CLUTCH OVERTHROW



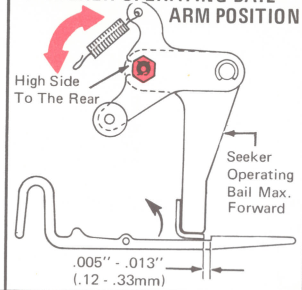
8 ARMATURE KNOCK-OFF



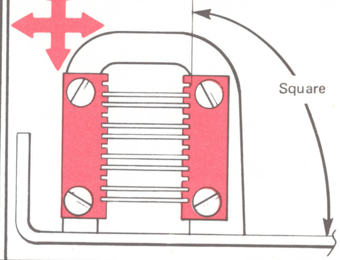
9 OPERATING BAIL TO SEEKER ENGAGEMENT



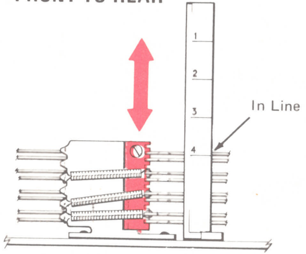
10 SEEKER OPERATING BAIL ARM POSITION



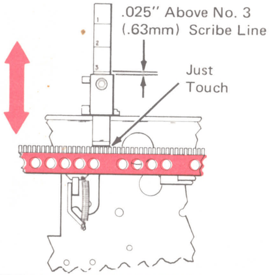
11 PERM. BAR GUIDES — SQUARENESS



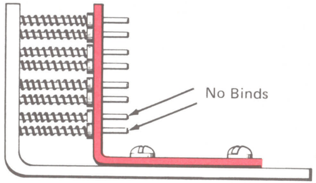
12 PERM. BAR GUIDES FRONT-TO-REAR



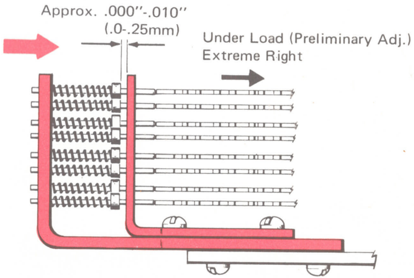
13 PERM. BAR GUIDES — HEIGHT



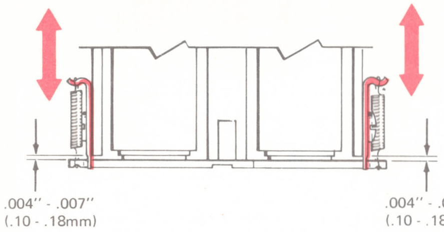
14 PLUNGER GUIDE



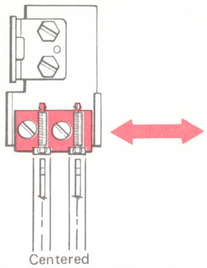
15 PLUNGER ASM. — PRELIMINARY



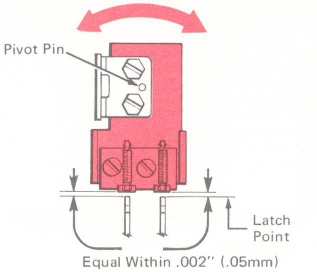
16 ARMATURE PIVOT PLATES — VERTICAL



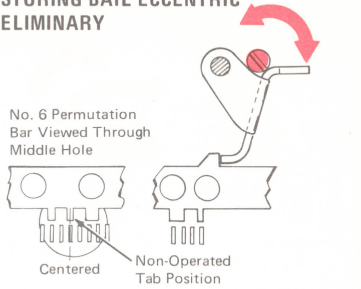
— LATERAL



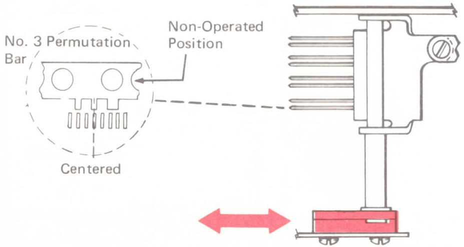
17 MAGNET POSITION — ROTATE



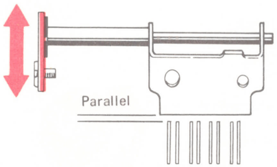
18 RESTORING BAIL ECCENTRIC PRELIMINARY


No. 6 Permutation Bar Viewed Through Middle Hole
Centered
Non-Operated Tab Position

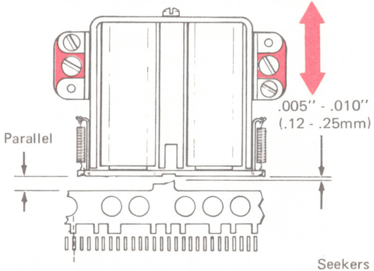
19 RESTORING BAIL — LATERAL



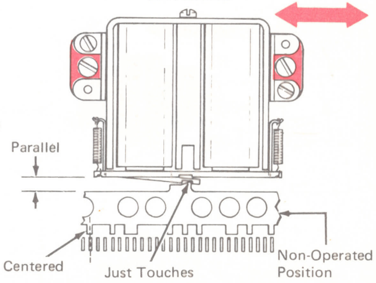
— VERTICAL



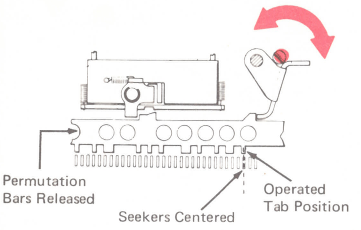
20 MAGNET ASM. POSITION — VERTICAL



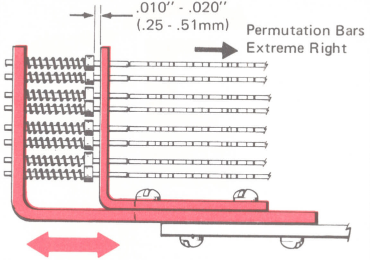
— LATERAL



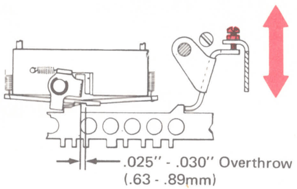
21 RESTORING BAIL STOP FINAL



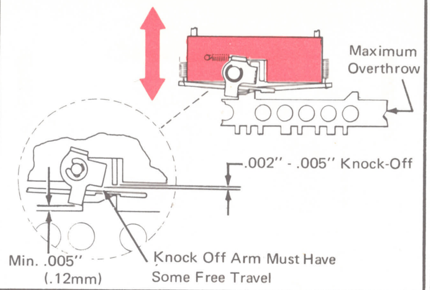
22 PLUNGER ASSEMBLY (FINAL)



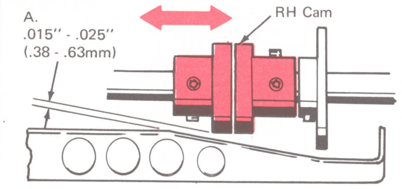
23 PERMUTATION RESTORING



24 ARMATURE KNOCK-OFF

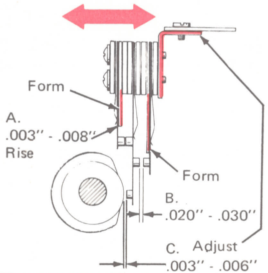


25 C. C. CONTACT CAM POSITION

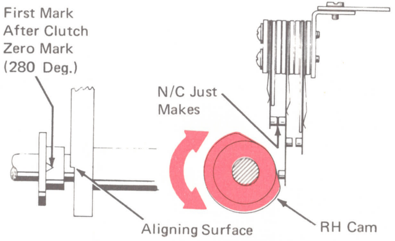


B.
Position Contact Asm & RH Cam So Op. Straps Track In Center Of Cams.

26 CONTACT ADJUSTMENT

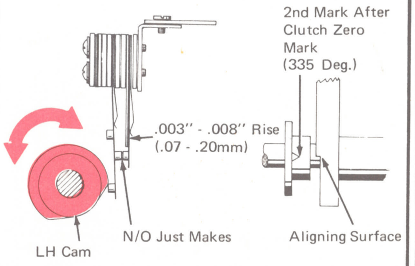


27 CYCLE CLUTCH CONTACT TIMING



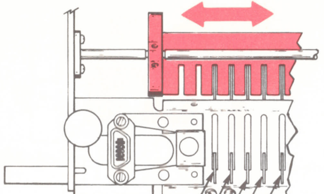
Contacts Must Transfer Without Bridging

28 TRANS. SEL. CONTACT TIMING



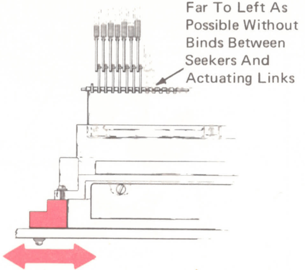
TRANSLATOR – MOVEABLE FRAME

29 ACTUATOR LINK ASM.



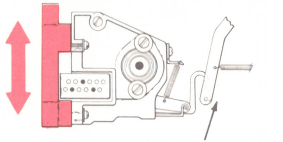
Actuators Centered In Slots (No Binds)

30 TRANSLATOR – HORIZONTAL



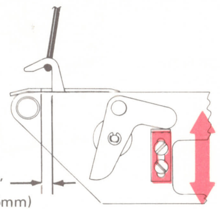
Far To Left As Possible Without Binds Between Seekers And Actuating Links

31 TRANSLATOR – VERTICAL



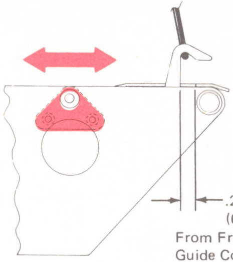
*Flush-With Actuator Cam In CCW Position

32 ACTUATOR CAM STOP



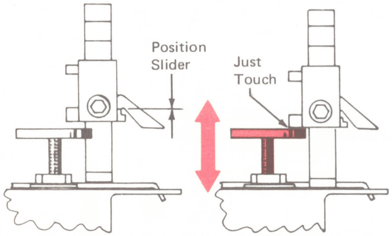
.250" (6.35mm) From Front Of Guide Comb Slot

33 ACTUATOR SHAFT GUIDE



.250" (6.35 mm) From Front Of Guide Comb. Slot

34 FRONT PRINTER SUPPORT

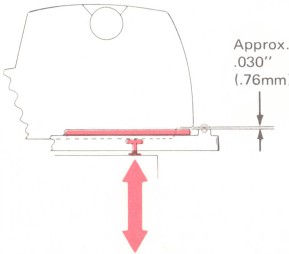


Position Slider

Just Touch

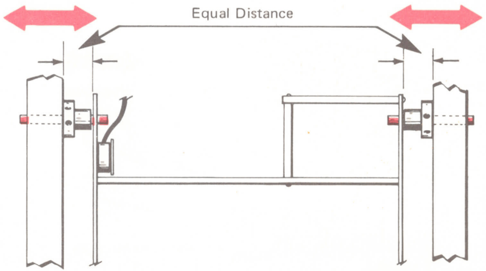
Check On Both Sides Of Translator

35 REAR PRINTER SUPPORT



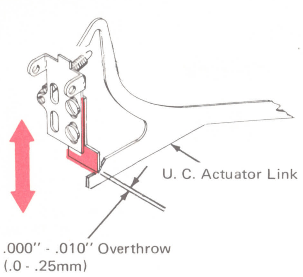
Approx. .030" (.76mm)

36 MOVABLE FRAME

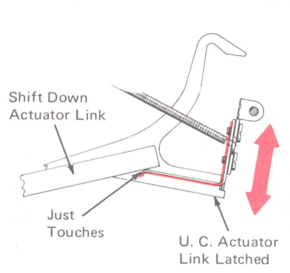


Equal Distance

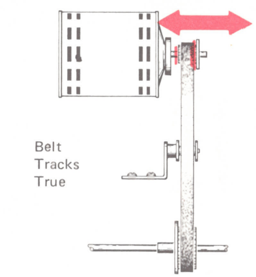
37 SHIFT LATCH



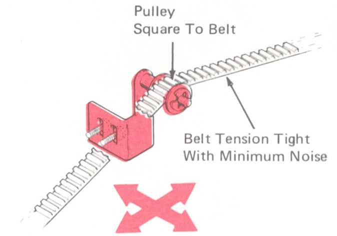
38 SHIFT UNLATCH



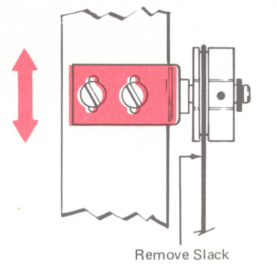
39 MOTOR PULLEY



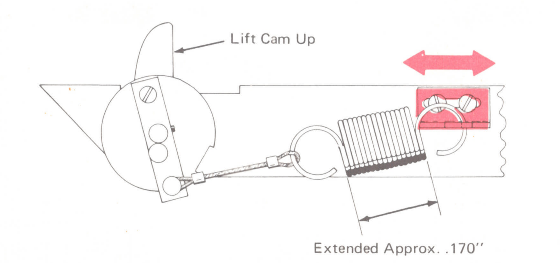
40 BELT TENSION



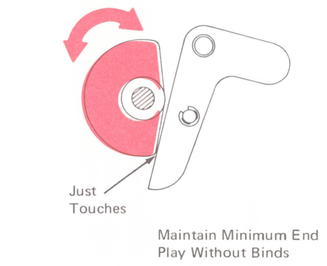
41 LIFT IDLER BRACKET



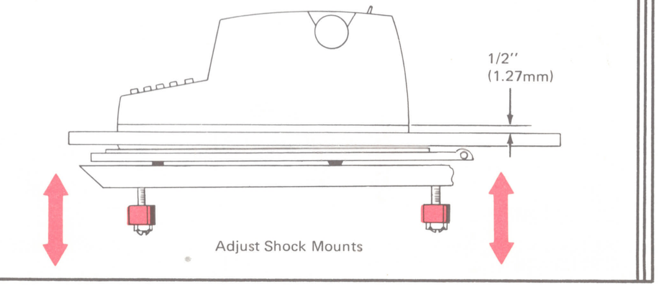
42 SPRING ANCHOR BRACKET



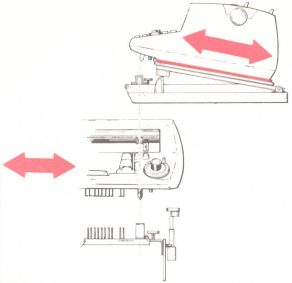
43 ACTUATOR CAM



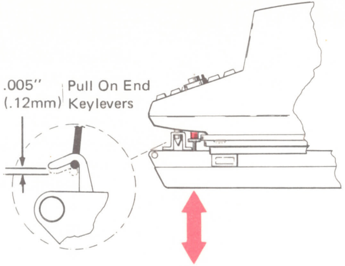
44 STATIONARY FRAME – HEIGHT



45 PRINTER LOCATING CONTOURS



46 KEYLEVERS TO ACTUATORS



"SELECTRIC" COMPOSER FONT CHART

Upper Case Lower Case

	11		10		9		8		7		6		5		4		3		2		1	
T-0	M * 6	M † 6	M (4	M) 4	M ! 4	H S 6	H $ 6	M + 6	M / 4	L ‘ 3	L ’ 3	H 8 6	H 2 6	H 9 6	H 0 6	M 1 6	M s 4	H 4 6	H 3 6	H 6 6	L , 3	L . 3
T-1	H % 8	H & 8	H B 7	H T 7	H A 8	M I 4	H L 7	H C 7	H ½ 8	L — 8	H ¾ 8	H 5 6	H 7 6	H b 6	M t 4	M a 5	M i 3	M l 3	M c 5	M [5	L - 3	M ? 5
T-2	H K 8	H W 9	H D 8	H O 8	H R 8	H N 8	H H 8	H M 9	H U 8	H V 8	H X 8	M k 6	H w 8	H d 6	M o 6	M r 4	M n 6	M h 6	H m 9	M u 6	M v 5	M x 6
T-3	M J 5	L : 4	H Q 8	H G 8	H F 7	H E 7	H Y 8	H P 6	H Z 7	H ¼ 8	H @ 8	M j 3	L ; 3	M q 6	H g 5	M f 4	M e 5	M y 6	M p 6	M z 5	M] 6	M = 6
	-5	-4	-3	-2	-1	H	1	2	3	4	5	-5	-4	-3	-2	-1	H	1	2	3	4	5

ALIGNMENT
(Gauge Font Alignment Check)

A. **Vertical** – Using 1/84th pitch and stick shift position one, make a strike up similar to the master sent with the gauge font. Compare this strike up with the gauge font master. The slight variations in vertical alignment of the master are inherent in the gauge font and will be the only variations you should see on your strike up.

It should be taken into consideration that the sample received with the gauge font is only as good as the machine on which it was produced. Therefore, the results obtained on the customer's machine should equal or exceed this gauge font sample.

B. **Horizontal** – Using 1/72nd pitch, stick shift position one and a leading dial setting of six, type several identical lines in upper case. The blocks should form parallel vertical lines between characters (Fig. 2). The printed line weight of an alignment block is approximately .005". Variations of more than 1/2 a line weight usually indicates an alignnment problem (Fig. 3).

By typing one sample slowly and one fast (system playback if possible), alignment problems due to carrier movement (escapement, cords, pulleys, binds, etc.) can be isolated from the carrier and rocker assembly (rotate detent, print sleeve end play, etc.).

NOTE: If available, the pocket comparator is a useful aid in viewing alignment samples.

UNIT BACKSPACE

Set the LH margin at zero and the RH at 12. Tab the carrier just past the RH margin and then repeat backspace to zero. The carrier should not hesitate and the indicating tube should restore to rest. Watch the pins for .030" – .050" overthrow.

Repeat backspace a few picas at the center and right of the machine, while lightly restricting the carrier movement.

CHARACTER BACKSPACE

A. Check for intermittent failure of the character backspace.

1. Tab the carrier away from the left margin.
2. Manually set all the pins in the pinwheel.
3. Operate the character backspace. Observe the pinwheel for single operation each time the character backspace keybutton is depressed. Operate the character backspace until the pinwheel has rotated 360 degrees.

B. Check for sufficient drive.

(**CAUTION:** This test should not be made near the LH margin).

1. Set the LH margin on 0, the RH margin on 36; position the carrier on 30.
2. Strike two lower case "m's", unit backspacing after the second "m".
3. Strike five more "m's", unit backspacing after each one.
4. Operate the character backspace once. The carrier should backspace to the second "m". No hesitation should be seen in the carrier motion.

C. Check for extra units.

1. Set the LH margin at zero.
2. Place the pitch selector in 1/72nd pitch.
3. Return the carrier and type four upper case "M's".
4. Return the carrier and type one upper case "M".
5. Operate the character backspace twice.
6. Strike two upper case "M's". The first "M" should be nine (9) units into overbank and the second "M" should strike over the "M" at the left-hand margin. Repeat several times.

CARRIER RETURN

A. Check to see if leadscrew is home before carrier return unlatches.

1. Set LH margin away from zero; pitch selector in 1/96th pitch.
2. Type lower case "wm" (17 units).

3. Return the carrier while blocking the homing pawl from latching.
4. Repeat this procedure several times. Watch for uneven left-hand margin. (This is the same as escapement check A.) Observe that homing stop reached home.

B. Check for proper latching and unlatching of carrier return.

1. Set LH margin at zero.
2. Operate carrier return while holding the LH margin rack.
3. Let the carrier move slowly into overbank.
    a. Carrier return should unlatch just before carrier return reaches full overbank.
    b. Pointer should indicate zero after carrier return unlatches.
4. Tab to 6, space and carrier return. Repeat several times.

CYCLE CLUTCH

Type a series of 8's while applying a light load to the print shaft. **CAUTION:** Do not use your hands as the print shaft keyway has sharp edges.

Operate a spacebar and the character "s" repeatedly and check for extra cycles (@/=).

Type several characters – backing the print shaft up after each character. Check for a buzzing cycle clutch.

ESCAPEMENT

A. Free System

1. Set LH margin away from zero; pitch selector in 1/96th pitch; return carrier.
2. Type lower case "wm" (17 units).
3. Return the carrier while blocking the homing pawl from latching.
4. Repeat this procedure several times. Watch for uneven left-hand margin and observe that the homing stop reaches home.

B. General

1. Type all characters alternately in upper and then lower case several times very fast and check for any escapement failures.
2. With the machine in the 1/72nd pitch, type several lines of upper case M's and W's as fast as possible and check to see that all characters near the end of the line are aligned under the ones above.
3. With the pitch selector lever in the 1/72nd pitch, type several characters; then move the pitch selector lever slowly forward, making sure not to overthrow the 1/84th pitch and observe that the machine did change pitches and did not skip or pile type. The only extra space between characters should occur between respective pitches. Follow the same procedure, moving the pitch selector lever to the 1/96th pitch position. Then follow the same procedure, moving the pitch selector lever in the other direction.
4. Repeat spacebar at all values while watching the set pins for correct and constant values. (If failures occur, check spacebar first.)

(**NOTE:** ALIGNMENT FAILURES CAN OFTEN LOOK LIKE ESCAPEMENT FAILURES!)

INDEXING

A. Mark one tooth on each index ratchet with a grease pencil and run the complete indexing check using a fast erratic carrier return operation rather than index.

B. With a sheet of paper in the machine, start with the leading dial on five and operate carrier return several times printing a character after each operation. Advance the leading dial after every group of operations and after all values have been operated; check closely for any indexing failures.

INDEXING CHECK

RATCHET REVOLUTIONS

MODE	LH	RH
5	1	1
6	1	2
7	1	3
8	1	4
9	2	1
10	2	2
11	2	3
12	2	4
13	3	1
14	3	2
15	3	3
16	3	4
17	4	1
18	4	2
19	4	3
20	4	4

INTERLOCKS

A. Carrier return to print.

1. Set LH margin to zero; tab carrier to right end of writing line. Return carrier and strike a character while carrier is returning. The character should not print until the carrier settles at LH margin.
2. Hold the spacebar in repeat and return the carrier. No spacebar operation should occur during return, but the spacebar operation should resume when carrier return unlatches.
3. Depress carrier return button into repeat; strike a character. The character should not print until the carrier return keybutton is released.

B. Shift to print.

1. Strike each character in upper and lower case alternately. Watch for keyboard lock-up or a delay in cycle clutch release.

C. Unit backspace to print.

1. Depress unit backspace into repeat; strike a character. The character should not print until the unit backspace button is released.

D. Print to unit backspace.

1. Hold spacebar into repeat; depress unit backspace button into repeat. The backspace operation should interrupt the spacebar operation.

E. Character backspace to print.

(**CAUTION:** Carrier should be away from LH margin for this test.)

1. Strike two lower case "m's"; backspace one unit. Strike five more "m's"; backspace one unit after each one. This clears all pins but one.
2. Depress the character backspace button.
3. Strike lower case "m" while the carrier is backspacing. This "m" should strike over the second "m".

F. Backspace in overbank.

1. Place pitch selector in 1/96th pitch.
2. Return the carrier.
3. Unit backspace twice. The character backspace should not operate.
4. Continue to backspace. The unit backspace should be completely interlocked sometime before you are 9 units into overbank.

JUSTIFIER

A. J-Tube Indexing

1. With the LH margin at zero and the pitch selector lever in 1/72 pitch, engage J-lever.
2. Operate spacebar once and return the carrier. Watch the J-tube for a single index.
3. Operate spacebar three times and return the carrier while watching the counter for proper indexing. Repeat several times.
4. Return the carrier and repeat spacebar until the pointer reaches:
   2 – Counter should read 8.
   4 – Counter should read 16.
   4-3/4 – Counter should read 19.
5. Hold the justifier tube and operate the carrier return. Allow the justifier tube to slowly return from 19 to zero.

B. Step-Down

1. Rotate quantity dial in both directions to check for binds.
2. Rotate value dial from 3 to 9 several times to check for binds.
3. Engage justification lever. A positive detent should be felt, as the lever is fully engaged. Slowly move the value dial from 3 to 4. The J-lever must snap back to rest.
4. Engage J-lever again. Value dial should move to 3.
5. Repeat the above, moving the value dial to a higher setting each time (5, 6, 7, 8 and 9).
6. Set the LH margin on zero; pitch selector on 1/72nd pitch, quantity dial on 20, and value dial on 3.
7. Return the carrier and repeat spacebar;

when pointer reaches:
2 – Quantity dial should read 12.
4 – Quantity dial should read 4.
4-3/4 – Quantity dial should read 1.

8. Quantity dial on 20 and value dial on 4; strike alternate spacebar and character until quantity dial reaches zero and value dial steps to 3. Quantity dial must step down and detent after each spacebar operation, but no dial movement should be seen during the character print cycle.

NOTE: Operate spacebar, character, spacebar, character, in both the read and write modes to observe that the counting operations do not count characters.

C. Indicator tube returning to LH margin.

1. Set tab stop at 40 and RH margin at 39.
2. Tab carrier to 40.
3. Carrier return while holding the indicator tube. Slowly allow the tube to return to the left.
4. Repeat step 3 with the margin on 74 and a tab stop at 75; margin at 12 and a tab stop at 13.

D. Tube Indication – Spacebar

1. Set RH margin at 12; tab stop at 9; spacebar value dial at 4 and the pitch selector at 1/96th.
2. Tab to 9; the white line should be on 48 in the 1/96th pitch window with the vernier adjustment approximately centered.
3. Space once and the white line should be on 44.
4. Unit backspace and ensure that the window graduations stay in alignment with the white line.

With the machine in the 1/72nd pitch, perform the following exercise:

NOTE: The tube should be manually released if it fails to trip on the sixth line in the above exercise.

JUSTIFICATION EXERCISE

```
LH Margin                  RH Margin  Tab Stop                                Justification   Number of
0                                 12  15                                      Data            Spacebars
1234567890123456                      1234567890123456                        (Blue - 3)      15 Spacebars
123456789012345                       1 2 3 4 5 6 7 8 9 0 1 2 3 4 5           (Blue - 12)     14 Spacebars
12345678901234                        1 2 3 4 5 6 7 8 9 0 1 2 3 4             (Orange - 8)    13 Spacebars
1234567890123                         1  2  3  4  5  6  7  8  9  0  1  2  3   (Green - 6)     12 Spacebars
123456789012                          1  2  3  4  5  6  7  8  9  0  1  2      (White -6)      11 Spacebars
12345678901                           1  2  3  4  5  6  7  8  9  0  1         (Red - 8)       10 Spacebars
12345 66 77 88 99                     1  2  3  4  5  66  77  88  99           (Yellow - 2)     8 Spacebars
```

KEYBOARD

Type each character three times and observe that no character fails to print and no keylever is hard to depress.

Let several characters on each side of the keyboard restore slowly and observe a restoring clearance.

With the machine running, pull up on the restoring roller and release a character and ease the roller down and make sure the character is tripped off. Try this check on each end and on each side of the center of the keyboard.

PAPER FEED

A. Skew

1. Machine settings
   Leading: 20 point.
   Font: UN-11-B or largest typestyle available.
   Impression: Stick 1 for the M-Dash (UC)
   Stick 5 for the "Z" (UC)
2. Type 20 lines of "Dashes".
3. Roll the paper back until the first line of dashes aligns with the horizontal scribe line on the cardholder and type one Z at each end of line.
4. Type full rows of upper case Z's on the succeeding lines.

   NOTE: The two Z's on the first line should be an equal distance from the dashes. If they are not, paper feed adjustments should be checked. Any change in the parallel condition between any succeeding lines of Z's and dashes will indicate a problem caused by font impact and requires installing the redesigned feed rolls.

B. Line to line variation.

1. Using a 1/72nd pitch font, type several upper case dashes in 1/84th pitch.
2. With the leading dial set at 20, return the carrier and repeat step 1 for approximately 2 platen revolutions.
3. Remove the paper and cut a straight line **down** the center of dashes just typed.
4. Now mis-match the two pieces of paper; i. e. line up the first line of dashes on one piece of paper with the 8th line of dashes on the other.
5. At no point should the dashes mis-match by more than .014" of an inch (approximately 1 point).

PRINT and RIBBON

A. Print

1. Type many periods, commas and colons and observe that the ribbon doesn't fail to feed while typing low velocity characters.
2. Type several periods, 1's, and m's and listen for the sound of three different velocities.
3. Operate the repeat spacebar and observe that the ribbon doesn't feed.
4. Latch the no-print key down, type several characters, and observe that the ribbon doesn't feed.
5. Type many upper case M's and W's using a UN-11-B type font and check for even top and bottom, and side-to-side. (Use impression position 1.)

6. Type a series of upper case M's and W's and check for proper placement on the ribbon and a minimum of voids on the paper. (Use impression position 6.) Check the DKD for no escapement at positions 38 and 41.
7. Type each character several times using customer's smallest type size. Check for embossing. (Use impression setting 1.)

SHIFT

Hold the shift cam detent arm released and depress a character, then shift. Observe that the character is stored.

Allow the detent arm to slowly return to rest, ensuring that it properly seats in the shift cam notch and that the character in storage is reliably released.

Repeat steps 1 and 2 several times in each case.

With the On/Off switch off – depress each character keybutton while manually shifting the escapement bails. Any interference between the escapement code bails and the interposers can be felt at the keybutton.

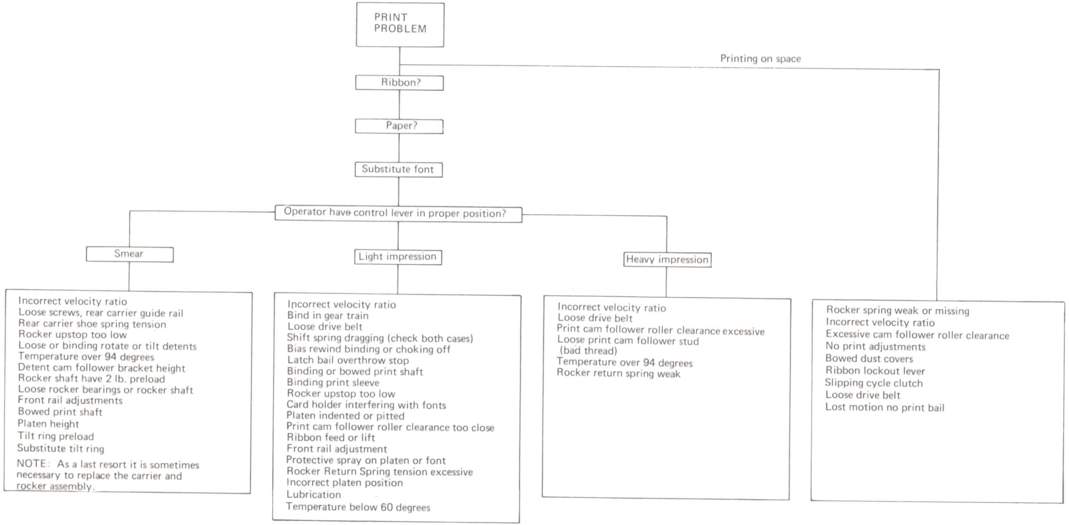
TAB

A. "Short" and "Long" Tab

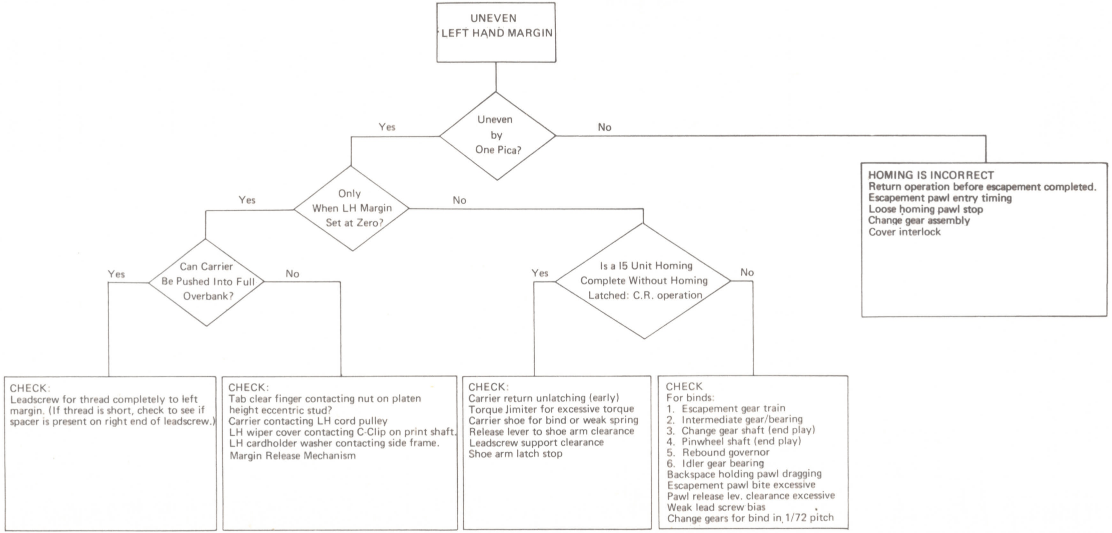
1. Set eight or ten tab stops at random across the writing line.
2. Place the pitch selector in 1/72nd pitch.
3. Depress the tab locate button.
4. Type the lower case characters "ce" at the LH margin. A single tab operation should move the carrier to the next tab stop (2 units away). Continue to type "ce" and tab alternately. The carrier should stop at every tab stop, set or cleared.
5. Type "de" at the LH margin. A single tab should now move the carrier to the second tab stop. Continue to type "de" and tab alternately. The carrier should stop at every other stop.
6. Restore tab locate button. Operate tab and print 1 in each column across the page at least ten lines in each pitch and observe all columns are aligned correctly.
7. With the RH margin set at position 12, set a tab stop at position 10 and tab to it and then away from it, making sure the tab does not fail to operate at this position.
8. Carrier return, unit backspace to limit and operate tab, ensure the carrier reaches a set tab stop.
9. Operate carrier return and then tab to check the catch tab operation.

B. Check tab brake and cord tightener.

1. Return the carrier and operate spacebar once.
2. Hold the bias rewind gear and operate the tab. There should be less than 1/32nd motion to the right by the carrier. Release the gear and the carrier should tab.
3. Repeat this test to check both lobes of the cam. Gang clear all tabs.


PRINT PROBLEM
Printing on space
Ribbon?
Paper?
Substitute font
Operator have control lever in proper position?
Smear
Light impression
Heavy impression
Incorrect velocity ratio
Loose screws, rear carrier guide rail
Rear carrier shoe spring tension
Rocker upstop too low
Loose or binding rotate or tilt detents
Temperature over 94 degrees
Detent cam follower bracket height
Rocker shaft have 2 lb. preload
Loose rocker bearings or rocker shaft
Front rail adjustments
Bowed print shaft
Platen height
Tilt ring preload
Substitute tilt ring
Incorrect velocity ratio
Bind in gear train
Loose drive belt
Shift spring dragging (check both cases)
Bias rewind binding or choking off
Latch bail overthrow stop
Binding or bowed print shaft
Binding print sleeve
Rocker upstop too low
Card holder interfering with fonts
Platen indented or pitted
Print cam follower roller clearance too close
Ribbon feed or lift
Front rail adjustment
Protective spray on platen or font
Rocker Return Spring tension excessive
Incorrect platen position
Lubrication
Temperature below 60 degrees
Incorrect velocity ratio
Loose drive belt
Print cam follower roller clearance excessive
Loose print cam follower stud (bad thread)
Temperature over 94 degrees
Rocker return spring weak
Rocker spring weak or missing
Incorrect velocity ratio
Excessive cam follower roller clearance
No print adjustments
Bowed dust covers
Ribbon lockout lever
Slipping cycle clutch
Loose drive belt
Lost motion no print bail

NOTE: As a last resort it is sometimes necessary to replace the carrier and rocker assembly.


UNEVEN LEFT HAND MARGIN
Uneven by One Pica?
Yes
No
Only When LH Margin Set at Zero?
Yes
No
Can Carrier Be Pushed Into Full Overbank?
Yes
No
Is a 15 Unit Homing Complete Without Homing Latched: C.R. operation
Yes
No

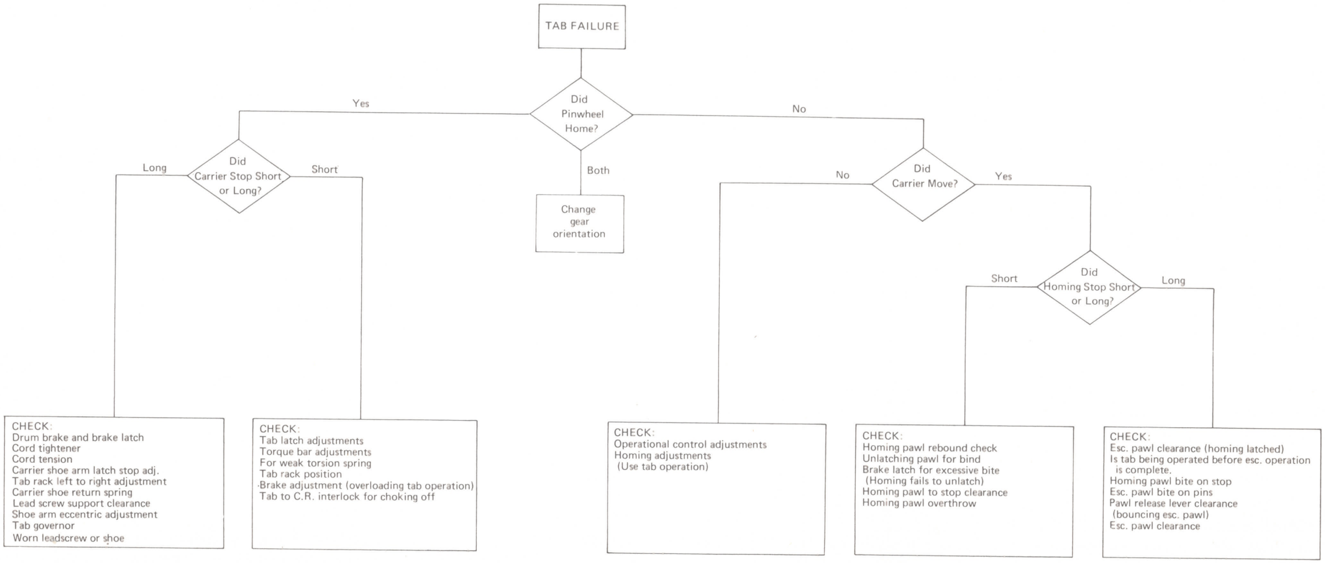
HOMING IS INCORRECT
Return operation before escapement completed.
Escapement pawl entry timing
Loose homing pawl stop
Change gear assembly
Cover interlock

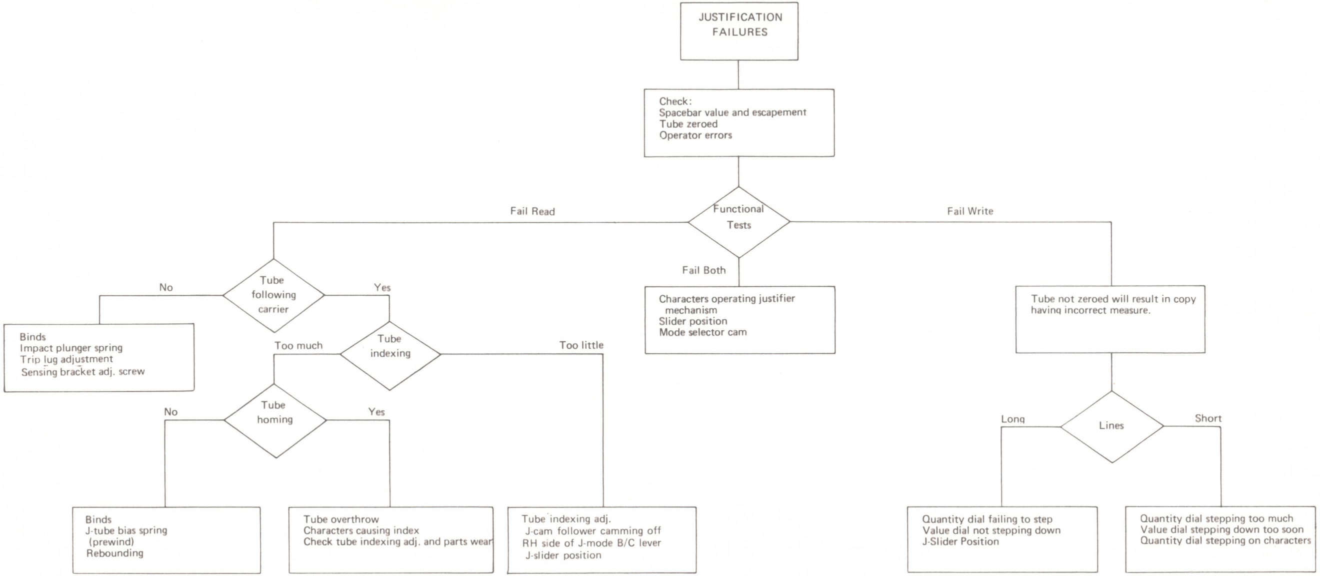
CHECK:
Leadscrew for thread completely to left margin. (If thread is short, check to see if spacer is present on right end of leadscrew.)

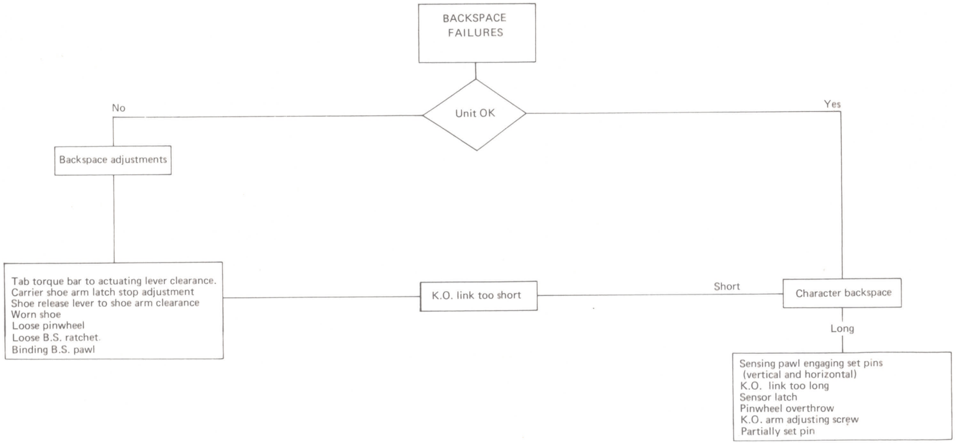
CHECK:
Tab clear finger contacting nut on platen height eccentric stud?
Carrier contacting LH cord pulley
LH wiper cover contacting C-Clip on print shaft.
LH cardholder washer contacting side frame.
Margin Release Mechanism

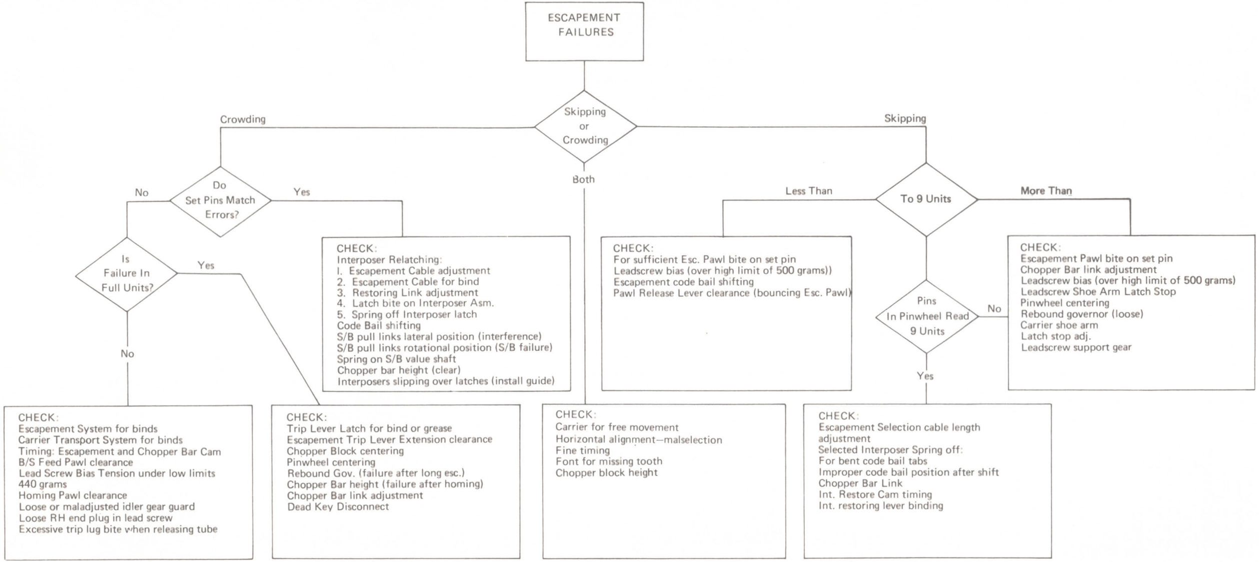
CHECK:
Carrier return unlatching (early)
Torque limiter for excessive torque
Carrier shoe for bind or weak spring
Release lever to shoe arm clearance
Leadscrew support clearance
Shoe arm latch stop

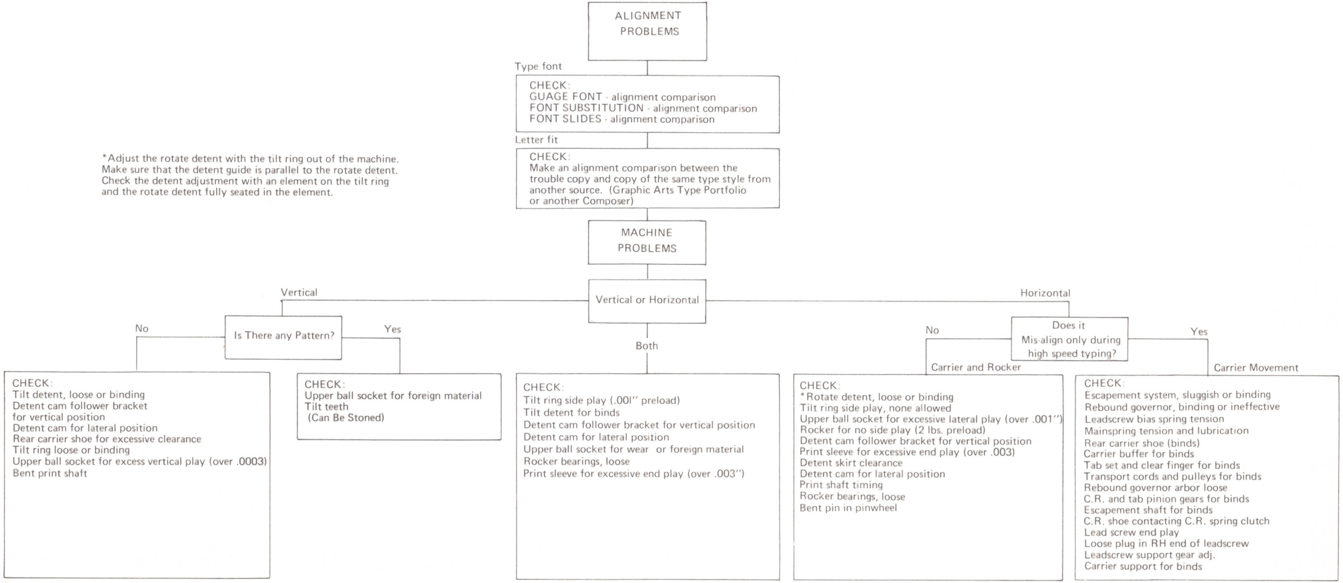
CHECK
For binds:
1. Escapement gear train
2. Intermediate gear/bearing
3. Change gear shaft (end play)
4. Pinwheel shaft (end play)
5. Rebound governor
6. Idler gear bearing
Backspace holding pawl dragging
Escapement pawl bite excessive
Pawl release lev. clearance excessive
Weak lead screw bias
Change gears for bind in 1/72 pitch


TAB FAILURE
Did Pinwheel Home?
Yes
No
Both
Change gear orientation
Did Carrier Stop Short or Long?
Long
Short
CHECK:
Drum brake and brake latch
Cord tightener
Cord tension
Carrier shoe arm latch stop adj.
Tab rack left to right adjustment
Carrier shoe return spring
Lead screw support clearance
Shoe arm eccentric adjustment
Tab governor
Worn leadscrew or shoe
CHECK:
Tab latch adjustments
Torque bar adjustments
For weak torsion spring
Tab rack position
Brake adjustment (overloading tab operation)
Tab to C.R. interlock for choking off
Did Carrier Move?
No
Yes
CHECK:
Operational control adjustments
Homing adjustments
(Use tab operation)
Did Homing Stop Short or Long?
Short
Long
CHECK:
Homing pawl rebound check
Unlatching pawl for bind
Brake latch for excessive bite
(Homing fails to unlatch)
Homing pawl to stop clearance
Homing pawl overthrow
CHECK:
Esc. pawl clearance (homing latched)
Is tab being operated before esc. operation is complete.
Homing pawl bite on stop
Esc. pawl bite on pins
Pawl release lever clearance
(bouncing esc. pawl)
Esc. pawl clearance


JUSTIFICATION FAILURES
Check:
Spacebar value and escapement
Tube zeroed
Operator errors
Functional Tests
Fail Read
Fail Write
Fail Both
Tube following carrier
No
Yes
Binds
Impact plunger spring
Trip lug adjustment
Sensing bracket adj. screw
Tube indexing
Too much
Too little
Tube homing
No
Yes
Binds
J-tube bias spring (prewind)
Rebounding
Tube overthrow
Characters causing index
Check tube indexing adj. and parts wear
Tube indexing adj.
J-cam follower camming off RH side of J-mode B/C lever
J-slider position
Characters operating justifier mechanism
Slider position
Mode selector cam
Tube not zeroed will result in copy having incorrect measure.
Lines
Long
Short
Quantity dial failing to step
Value dial not stepping down
J-Slider Position
Quantity dial stepping too much
Value dial stepping down too soon
Quantity dial stepping on characters


BACKSPACE FAILURES
Unit OK
No
Yes
Backspace adjustments
Tab torque bar to actuating lever clearance.
Carrier shoe arm latch stop adjustment
Shoe release lever to shoe arm clearance
Worn shoe
Loose pinwheel
Loose B.S. ratchet.
Binding B.S. pawl
K.O. link too short
Short
Character backspace
Long
Sensing pawl engaging set pins (vertical and horizontal)
K.O. link too long
Sensor latch
Pinwheel overthrow
K.O. arm adjusting screw
Partially set pin


ESCAPEMENT FAILURES
Skipping or Crowding
Crowding
Skipping
Both
Do Set Pins Match Errors?
No
Yes
Is Failure In Full Units?
Yes
No
CHECK:
Escapement System for binds
Carrier Transport System for binds
Timing: Escapement and Chopper Bar Cam
B/S Feed Pawl clearance
Lead Screw Bias Tension under low limits 440 grams
Homing Pawl clearance
Loose or maladjusted idler gear guard
Loose RH end plug in lead screw
Excessive trip lug bite when releasing tube
CHECK:
Trip Lever Latch for bind or grease
Escapement Trip Lever Extension clearance
Chopper Block centering
Pinwheel centering
Rebound Gov. (failure after long esc.)
Chopper Bar height (failure after homing)
Chopper Bar link adjustment
Dead Key Disconnect
CHECK:
Interposer Relatching:
I. Escapement Cable adjustment
2. Escapement Cable for bind
3. Restoring Link adjustment
4. Latch bite on Interposer Asm.
5. Spring off Interposer latch
Code Bail shifting
S/B pull links lateral position (interference)
S/B pull links rotational position (S/B failure)
Spring on S/B value shaft
Chopper bar height (clear)
Interposers slipping over latches (install guide)
CHECK:
Carrier for free movement
Horizontal alignment—malselection
Fine timing
Font for missing tooth
Chopper block height
To 9 Units
Less Than
More Than
CHECK:
For sufficient Esc. Pawl bite on set pin
Leadscrew bias (over high limit of 500 grams))
Escapement code bail shifting
Pawl Release Lever clearance (bouncing Esc. Pawl)
Pins In Pinwheel Read 9 Units
No
Yes
CHECK:
Escapement Pawl bite on set pin
Chopper Bar link adjustment
Leadscrew bias (over high limit of 500 grams)
Leadscrew Shoe Arm Latch Stop
Pinwheel centering
Rebound governor (loose)
Carrier shoe arm
Latch stop adj.
Leadscrew support gear
CHECK:
Escapement Selection cable length adjustment
Selected Interposer Spring off:
For bent code bail tabs
Improper code bail position after shift
Chopper Bar Link
Int. Restore Cam timing
Int. restoring lever binding



Type font

CHECK:
GUAGE FONT - alignment comparison
FONT SUBSTITUTION - alignment comparison
FONT SLIDES - alignment comparison

Letter fit

CHECK:
Make an alignment comparison between the trouble copy and copy of the same type style from another source. (Graphic Arts Type Portfolio or another Composer)

Vertical – Is There any Pattern? – No

CHECK:
Tilt detent, loose or binding
Detent cam follower bracket for vertical position
Detent cam for lateral position
Rear carrier shoe for excessive clearance
Tilt ring loose or binding
Upper ball socket for excess vertical play (over .0003)
Bent print shaft

Vertical – Is There any Pattern? – Yes

CHECK:
Upper ball socket for foreign material
Tilt teeth
(Can Be Stoned)

Both

CHECK:
Tilt ring side play (.00l" preload)
Tilt detent for binds
Detent cam follower bracket for vertical position
Detent cam for lateral position
Upper ball socket for wear or foreign material
Rocker bearings, loose
Print sleeve for excessive end play (over .003")

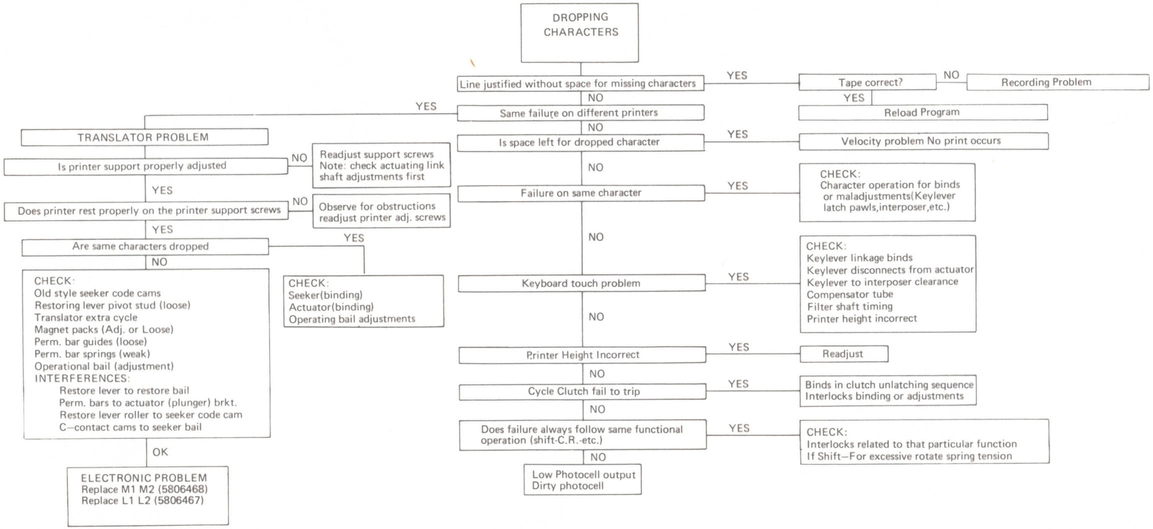
Horizontal – No – Carrier and Rocker

CHECK:
*Rotate detent, loose or binding
Tilt ring side play, none allowed
Upper ball socket for excessive lateral play (over .001")
Rocker for no side play (2 lbs. preload)
Detent cam follower bracket for vertical position
Print sleeve for excessive end play (over .003)
Detent skirt clearance
Detent cam for lateral position
Print shaft timing
Rocker bearings, loose
Bent pin in pinwheel

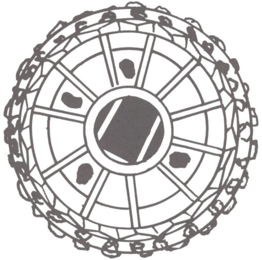
Horizontal – Yes – Carrier Movement

CHECK:
Escapement system, sluggish or binding
Rebound governor, binding or ineffective
Leadscrew bias spring tension
Mainspring tension and lubrication
Rear carrier shoe (binds)
Carrier buffer for binds
Tab set and clear finger for binds
Transport cords and pulleys for binds
Rebound governor arbor loose
C.R. and tab pinion gears for binds
Escapement shaft for binds
C.R. shoe contacting C.R. spring clutch
Lead screw end play
Loose plug in RH end of leadscrew
Leadscrew support gear adj.
Carrier support for binds

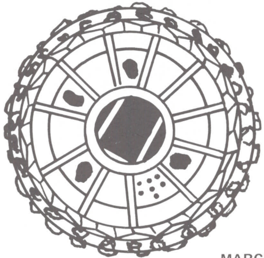
*Adjust the rotate detent with the tilt ring out of the machine. Make sure that the detent guide is parallel to the rotate detent. Check the detent adjustment with an element on the tilt ring and the rotate detent fully seated in the element.


DROPPING CHARACTERS
Line justified without space for missing characters
YES
Tape correct?
NO
Recording Problem
YES
Reload Program
NO
Same failure on different printers
YES
TRANSLATOR PROBLEM
Is printer support properly adjusted
NO
Readjust support screws Note: check actuating link shaft adjustments first
YES
Does printer rest properly on the printer support screws
NO
Observe for obstructions readjust printer adj. screws
YES
Are same characters dropped
YES
CHECK: Seeker(binding) Actuator(binding) Operating bail adjustments
NO
CHECK: Old style seeker code cams Restoring lever pivot stud (loose) Translator extra cycle Magnet packs (Adj. or Loose) Perm. bar guides (loose) Perm. bar springs (weak) Operational bail (adjustment) INTERFERENCES: Restore lever to restore bail Perm. bars to actuator (plunger) brkt. Restore lever roller to seeker code cam C—contact cams to seeker bail
OK
ELECTRONIC PROBLEM Replace M1 M2 (5806468) Replace L1 L2 (5806467)
NO
Is space left for dropped character
YES
Velocity problem No print occurs
NO
Failure on same character
YES
CHECK: Character operation for binds or maladjustments(Keylever latch pawls,interposer,etc.)
NO
Keyboard touch problem
YES
CHECK: Keylever linkage binds Keylever disconnects from actuator Keylever to interposer clearance Compensator tube Filter shaft timing Printer height incorrect
NO
Printer Height Incorrect
YES
Readjust
NO
Cycle Clutch fail to trip
YES
Binds in clutch unlatching sequence Interlocks binding or adjustments
NO
Does failure always follow same functional operation (shift-C.R.-etc.)
YES
CHECK: Interlocks related to that particular function If Shift—For excessive rotate spring tension
NO
Low Photocell output Dirty photocell

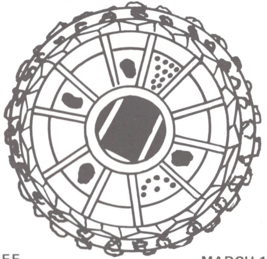
PRIOR TO MAY 1967 – NO DOTS



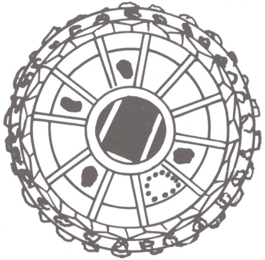
JULY 1967 – SEVEN DOTS



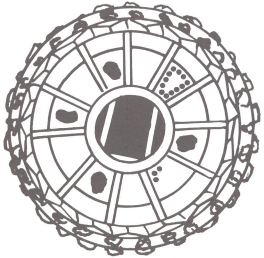
JULY 1968 – TWELVE DOTS TO SEVEN DOTS



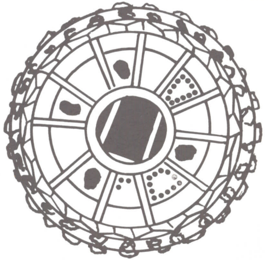
DECEMBER 1968 – TWELVE DOTS – CIRCULAR ONLY



MARCH 1969 – TWELVE DOTS – THREE DOTS BOTH CIRCULAR PATTERNS



MARCH 1970 – TWELVE DOTS – TWELVE DOTS – THREE DOTS – ALL CIRCULAR PATTERNS



PROGRAM STEP SET

IMM. ARITH.

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
				ADDRESS				IMMEDIATE DATA								
				32	16	8	4	128	64	32	16	8	4	2	1	
1	1	0	0													SUBTRACT
1	1	0	1													COMPARE
1	1	1	0													ADD
1	1	1	1													TRANSFER
				Y6	Y5	Y4	Y3									

ARITH. OPER.

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
				ADDRESS 2						ADDRESS 1						
				32	16	8	4	2		32	16	8	4	2		
0	1	0	0						0						0	SUBTRACT
0	1	0	1						0						0	COMPARE
0	1	1	0						0						0	ADD
0	1	1	1						0						0	TRANSFER
0	1	0	(1)						A1 Ind.						A2 Ind.	BYTE COMPARE
0	1	1	(1)						"						"	BYTE TRANSFER
				Y6	Y5	Y4	Y3	Y2		Y6	Y5	Y4	Y3	Y2		

(1) = Bump by 1

(0) = No Bump

BRANCH

(1) = Link

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
					ADDRESS											
					1024	512	256	128	64	32	16	8	4	2		
0	0	0	0	(1)											0	UNCONDITIONAL
0	0	0	1	"											1	JUMP ON HI
0	0	1	0	"											0	JUMP ON LO
0	0	1	0	"											1	JUMP ON EQUAL
0	0	1	1	"											0	JUMP ON NOT EQUAL
					Y11	Y10	Y9	Y8	Y7	Y6	Y5	Y4	Y3	Y2		

INCR. JUMP

(0) = Jmp if Bit Off (Not Equal)

(1) = Jmp if Bit On (Equal)

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
					BIT				REG		INCR					
					8	4	2	1			16	8	4	2		
1	0	1	0	(1)					00 = 16 01 = 48						0	JUMP FORWARD
1	0	0	0	"					10 = 24 11 = 56						0	JUMP BACKWARD
									Y4	Y6						

PROG. CTRL.

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
					BIT					ADDRESS						– SAMPLED –
					8	4	2	1		32	16	8	4	2		
0	0	1	1												1	BIT "ON" CONDITIONS - -LO & EQUAL BIT "OFF" CONDITIONS- LO & NOT EQUAL
										Y6	Y5	Y4	Y3	Y2		

0 —— RESET —— 0
0 —— PRESERVE —— 1
1 —— SET —— 0

I/O INST.

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
					DEVICE					ADDRESS						
0	0	0	1	1	8	4	2	1	0	32	16	8	4	2	0	INPUT
0	0	0	1	0	MPX (1)				Ind Out						0	OUTPUT

BOUND. JUMP

Op1	Op2	Op3	Op4	Op5					Op6						Op7	
					ADDRESS											
					1024	512	256	128	64	32	16	8	4	2		
0	0	0	0	1											1	UNCONDITIONAL
0	0	0	1	1											1	JUMP ON HI
0	0	1	0	1											0	JUMP ON LO
0	0	1	0	1											1	JUMP ON EQUAL
0	0	1	1	1											0	JUMP ON NOT EQUAL
					Y11	Y10	Y9	Y8	Y7	Y6	Y5	Y4	Y3	Y2		

PREFIX

Op1	Op2	Op3	Op4	Op5					Op6						Op7
1	0	Px A2	Px A1	0	0	0	0	0	0	0	0	0	0	0	1

DEVICE CODES

INPUT

1	PT READER
2	MT READER (RH STA)
7	CONTROL PANEL
10	MT READER (LH STA)

OUTPUT

0	TRANSLATOR
2	MT READER (LH STA)
4	T.T.R.
6	MT READER (RH STA)
7	CONTROL PANEL

PRECON STORAGE INFORMATION

K–103 & K–104
(256,260,261)

BYTE	STORED DATA	NOTES	LOADER (1)
2	Measure, 3rd (2)	Binary value	432
6	Measure, 2nd	Binary value	432
10	Measure, 1st	Binary value	432
14	Line Indent Value, 3rd (2)	Binary value	0
18	Line Indent Value, 2nd	Binary value	0
22	Line Indent Value, 1st	Binary value	0
32	Line Counter (Output)	Binary value	0
34	Line Count Value	Binary value	34
36	Line Counter (Input)	Binary value	0
38	Merge Address	Binary value of next merge line	0
48	Mode Storage	Leader Dot, Bit 3 on	Off
		Flush Right, Bit 4 on	Off
		Center, Bit 5 on	Off
		Flush Left, Bit 6 on	Off
		Justify, Bit 7 on	On
56	Indicators	Printer in U. C., Bit 1 on	Off
		Line Stop depressed, Bit 2 on	Off
		Merge Yes, Bit 7 on	Off
178	Paragraph Indent Value	Binary value	12
179	Leader Space Value	Binary value	3
180	Minimum Interword Value	Binary value	3
181	Maximum Interword Value	Binary value	12
182	Maximum Quad Value	Binary value	20
183	Line Expand Decision	Bit 2 On, yes	On
184	Dead Key Decision	Bit 2 On, yes	Off
185	News Font	Bit 2 On, yes	Off
186	Begin Output Block	Except on Precon 261 (see below)	
226	Begin Output Block	Precon 261 Only	
300	Begin Input Block	Precon 260 Only	
304	Begin Input Block	Precon 261 Only	
352	Begin Input Block	Precon 256 Only	

Precon 261 uses 40 Bytes beginning with Byte 186 to store the Mode/Measure pairs. The low byte (even) contains the Mode indication: Flush Right, Bit 4; Center, Bit 5; Flush Left, Bit 6. The upper byte (odd) contains the measure in binary value.

Note (1): This column indicates the condition of each of the above Register/Bytes after one of the Precons has been loaded; referred to as the "Finish Loader".

Note (2): Measure value and Line Indent value are stored in several registers. The high order register contains the 1st level or original values. This allows the machine to accept a new measure or line indent change while still processing on the original value.

MT/SC

TRANSLATOR CODE CHART

CHAR.		ESC.		PERMUTATION CODE								BINARY
LC	UC	LC	UC	8	7	6	5	4	3	2	1	EQUIV.
a	A	5	8				5	4		2	1	27
b	B	6	7			6	5		3	2		54
c	C	5	7				5		3	2	1	23
d	D	6	8						3	2	1	7
e	E	5	7						3	2		6
f	F	4	7				5	4	3		1	29
g	G	5	8					4	3		1	13
h	H	6	8			6			3	2		38
i	I	3	4				5	4		2		26
j	J	3	5					4	3			12
k	K	6	8				5		3	2		22
l	L	3	7			6			3	2	1	39
m	M	9	9					4			1	9
n	N	6	8				5		3			20
o	O	6	8			6		4		2	1	43
p	P	6	6					4	3	2		14
q	Q	6	8				5	4	3	2		30
r	R	4	8					4		2	1	11
s	S	4	6			6		4		2		42
t	T	4	7						3			4
u	U	6	8				5		3		1	21
v	V	5	8				5	4			1	25
w	W	8	9			6	5	4		2		58
x	X	6	8						3		1	5
y	Y	6	8			6		4	3	2		46
z	Z	5	7			6	5			2	1	51
1	!	6	4								1	1
2	†	6	6				5					16
3	+	6	6				5				1	17
4	$	6	6			6				2	1	35
5	%	6	8							2		2
6	/	6	4				5			2		18
7	&	6	8							2	1	3
8	*	6	6				5			2	1	19
9	(	6	4			6	5			2		50
0	)	6	4			6				2		34
,	'	3	3				5	4	3	2	1	31
.	'	3	3				5	4				24
?	¾	5	8					4	3	2	1	15
-	—	3	8			6	5	4	3	2		62
;	:	3	4			6		4	3	2	1	47
]	¼	6	8					4				8
[	½	5	8					4		2		10
=	@	6	8				5	4	3			28
KEYBUTTON No's					3	4	5	6	7	8	R	

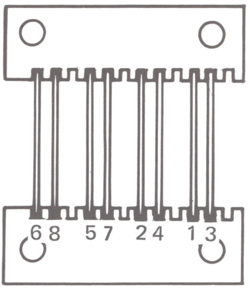
MT/SC

FUNCTIONS

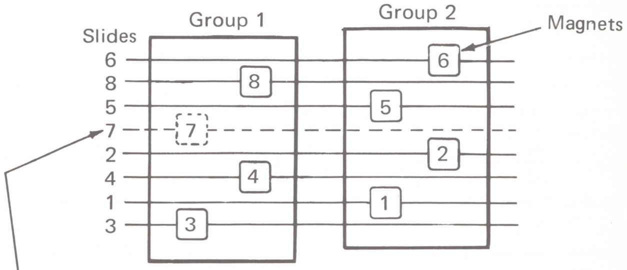
L C SHIFT			6		4	3	1	45
U C SHIFT			6			3	1	37
TAB			6		4			40
CAR. RET.			6					32
BACKSPACE			6		4		1	41
SPACE			6		4	3		44
FEED			6	5		3		52
SWITCH			6	5				48
STOP			6	5			1	49
STOP XFER.			6	5	4	3	1	61
AUTO SCH.			6	5	4			56
4-UNIT		7						64
NO PRINT	8							128
KEYBUTTON	3	4	5	6	7	8	R	

BINARY BIT	128	64	32	16	8	4	2	1
MT/ST CODE	SCH	SFT	R2A	R1	T2	T1	R2	R5
MT/ST BIT		8	3	1	6	5	2	4

PERMUTATION BAR LOCATIONS



(VIEWED FROM LEFT OF TRANSLATOR)



TRANSLATOR SEL MAG AND SLIDE ARRANGEMENT
(TOP VIEW)

MT/ST CODES									
2	1								
3	1			4			7		
4		2	3	4					
5		2							
6	1	2					7		
7		2		4			7		
8	1	2		4					
9	1	2	3						
0		2	3				7		
a	1	2		4		6	7		
b	1	2	3		5		7		
c	1	2		4	5		7		
d		2		4	5				
e		2			5		7		
f	1			4	5	6	7		
g				4	5	6			
h		2	3		5				
i	1	2				6			
j					5	6	7		
k	1	2			5				
l		2	3	4	5		7		
m				4		6	7		
n	1				5		7		
o		2	3	4		6	7		
p		2			5	6			
q	1	2			5	6	7		
r		2		4		6			
s		2	3			6			
t					5				
u	1			4	5				
v	1			4		6			
w	1	2	3	4		6	7		
x				4	5		7		
y		2	3		5	6	7		
z							7		
/		2	3	4	5	6			
;		2		4	5	6	7		
,	1	2		4	5	6			
.	1					6	7		
!						6			
'		2				6	7		
=	1				5	6			
—	1	2	3		5	6			
[				4					
REVISE CR			3						
TAB			3			6	7		
SPACE			3		5	6			
STOP	1		3	4					
FEED	1		3		5				
BACKSPACE			3	4		6			
AUTO-SEARCH	1		3			6			
STOP-TRANS.	1		3	4	5	6			
SWITCH	1		3				7		
PROG. SEARCH	1		= 3	4		6	7		
RED RIBBON			3	4	5	6	7		
ADJO	1		3		5	6	7		

NO PRINT ESCAPEMENT TABLE
K–103 & K–104

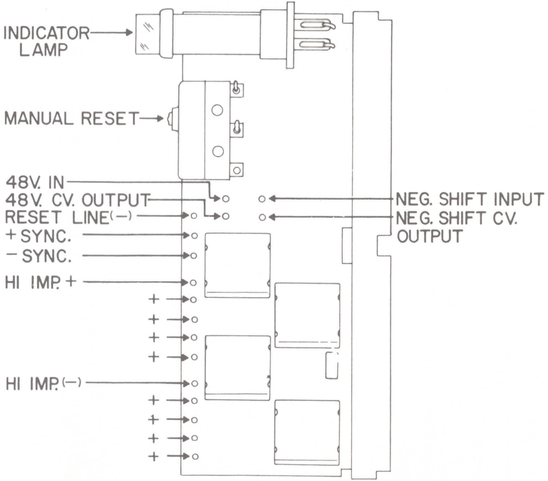
UNITS	L.C.	BYTE	DATA	BINARY	U.C.	BYTE	DATA	BINARY
3	,	142	36789R	159	'	149	36789R	159
4	s	143	3579	170	/	150	369	146
5	[	144	379	138	J	151	378	140
6	x	145	38R	133	P	152	3789	142
7	spec	146	4	64	spec	153	0	0
8	w	147	35679	186	½	154	379	138
9	NP	148	3	128	NP	155	3	128

(BINARY total equals total bit value of character PLUS 128, the no-print value— the numbers in this column may be used when entering "spaces" on Precon 264)

Note: Seven unit escapement uses 4 unit and 3 unit. The special lower case data configuration is for 4 unit Paper Tape numerals.

Clearing the "3" of a character configuration (Data Column) will cause that character to print. To return to normal NP escapement, either correct byte changed or reload the precon tape. Do not clear the "3" of the 9 unit escapement no-print however since this NP is not a character – clearing will cause a dummy cycle of the translator.
Changing the 3 of a 9 unit escapement to 7R will make the M print in order to check the 9 unit escapement.

CE LATCH CARD LAYOUT



DIAGNOSTIC CHECK FOR TRANSLATOR

Diagnostic Check for Translator: Print-out errors are sometimes difficult to diagnose, especially if the errors are intermittent. The following diagnostic techniques will aid the CE in finding translator problems.

If the errors are character substitution, they can in most cases be diagnosed from the translator code chart in the systems diagrams (page 901). A character substitution is normally caused by a permutation bar slipping off its armature or by a selected permutation bar failing to move away from its armature. By analyzing the permutation bar configuration required to give the error and by comparing it to the proper permutation bar configuration, the cause of failure can usually be found. If no failure pattern can be found, the CE should install one or more output steps in the low order portion of memory to check the various output characters.

An example program to output two characters sequentially is as follows:

Address		**Data**
0	89	Output to translator from Reg 6
1	6	
2	7	Output to translator from Reg 8
3	6	
4	0	Unconditional Jump to 0
5	0	
6		1st Character desired
7	0	
8		2nd Character desired
9	0	

Install any characters* desired in byte 6 and byte 8 using the translator code chart. Start the program in address 0. With the Composer off the system and the translator covers removed, the motion of the permutation bars can be observed. By switching the clock control switch to program step, an output instruction will occur each time the step button is depressed when the output step is addressed. After using your program, address register 546 to return to the composition program.

*NOTE: To detect a slipping permutation bar, install an output character that selects the permutation bar next to the suspected one. If the permutation bar is slipping, it will usually fail more frequently if the permutation bar beside it is activated due to mechanical vibrations.

The following charts list the most probable causes of various errors caused by the translator.

1. Error shows gaining bits (permutation bar slips off armature).
   Causes: Check in the following sequence.

   a. Plunger actuator assembly adjustment not correct causing permutation bar bounce, fails to latch.

      Solution: Adjust to spec. (Frame 15, Translator Adjustment Section).

   b. Loss of permutation bar overthrow which does not allow permutation bar to latch on armature when restored.

      Solution: Correct with overthrow adjusting screw. (Frame 23, Translator Adjustment Section).

   c. Too much overthrow, causing permutation bars to jam against actuator assembly plate and bouncing off armature.

      Solution: Same solution as Item b.

   d. Armature out of line with permutation bar allowing bar to slip off.

      Solution: Adjust armature pivot plate to align correctly.

e. Insufficient knock-off at knock-off bail. Permutation bar does not latch.

Solution: Adjust knock-off bail correctly (Frame 24, Translator Adjustment Section).

f. Too large a radius on the permutation bar causing it to cam off the armature.

Solution: Replace with new permutation bar.

g. Damaged permutation bar or armature.

Solution: Replace either or both.

2. Error shows losing bits (permutation bar failing to move away from its armature).
Causes: Check the following in sequence.

a. Armature does not pick.

Solution: Check for open or shorted magnet coil or input signal to the magnet involved.
NOTE: Selection Magnet Coil Resistance = 775 ± 5 ohms
Cycle Clutch Magnet Coils – Series Resistance
2 Coils - 260 ± 20 ohms

b. Permutation bar binds.

Solution: Check knock-off bail for clearance to permutation bars and correct if necessary. Check bar guides for proper adjustment (Frames 11,12 & 13, Translator Adjustment Section.)

c. Plunger bind to actuator assembly.

Solution: Realign assembly to operate freely and within specification adjustment (Frame 14,Translator Adjustment Section).

3. Error shows characters not being printed.
Causes: Check the following.

a. Seeker not being operated.

Solution: Adjust the operating bail for correct seeker engagement (Frame 9 & 10, Translator Adjustment Section).

b. Actuator to printer link not operating because of binds.

Solution: Check for bent actuator link or seeker binding in guide comb.
OR
Solution: Adjust translator to remove bind. Straighten bent parts or replace them.

c. Actuator links operate but do not pull keylevers due to slipping off side of keylever links.

Solution: Check for short stems on keylever links and replace bad ones. Check printer guide position and correct if necessary.

d. Printer keylever pulls but does not trip cycle shaft.

Solution: Check for correct height setting of the printer and support assembly. DO NOT CHANGE UNLESS INCORRECT. If keylever still does not trip, check keylever to interposer latch clearance and correct if necessary.

PAPER TAPE READER DIAGNOSTIC CHECK

Paper Tape Reader Diagnostic Check: The following program will allow you to check the PT Reader for an intermittent contact failure.

Remove the stepping pawl spring from the PT Reader. Using one of the pre-punched Mylar ® tapes furnished with the system, align the sensing pins to an 8-hole punch.

Clear register 0 through 14, and 32. Enter the following program.

Address	Data	
0	36	
1	67	Input from Pt to Reg 16
2	3456789R	
3	3468	Immed Compare Reg 16 to Data 255
4	R	
5	5	Jump on Equal to Reg 0
6	36	
7	69R	Output to lights Reg 16
8	35	
9	679R	Input from Control Panel to Reg 32
10	89R	
11	5	Jump on Equal to Reg 6
12	3789	
13	69R	Output to lights from Reg 14
14	0	
15	0	Unconditional Jump to Reg 0
32	0	
33	0	

Address Reg. 0, and position the edit switch to process. The PT Reader will read 8 bits and compare them to the data in Reg. 2. If any bit is not sensed, it will be displayed by the lights when the error occurs.

To check for an unwanted contact closure, position a portion of the tape containing no punches over the sensing pins, and then clear all the bits from Byte 2 of the program. If any contact makes, it will be displayed by the lights.

To restart the program AFTER AN ERROR is sensed, DEPRESS ANY CONSOLE KEYBUTTON.

PAPER TAPE TTS CODES*

Shift			E	3/8			A	!			S		I	—	U	7/8
Unshift	Tape Feed	Thin Space	e	3	Elevate	(P.F.)	a	$	Space Band	Space Band	s	Em Space	i	8	u	7
1		●		●		●		●		●		●		●		●
2			●	●			●	●			●	●			●	●
3					●	●	●	●					●	●	●	●
Tape Feed	o	o	o	o	o	o	o	o	o	o	o	o	o	o		o
4									●	●	●	●	●	●	●	●
5																
6																

Shift		↓	D	+	R	1/2	J		N		F		C		K	
Unshift	Return	↓	d	-	r	4	j	(Bell)	n	Comma	f	Quad Left	c	En Space	k	Quad Right
1		●		●		●		●		●		●		●		●
2			●	●			●	●			●	●			●	●
3					●	●	●	●					●	●	●	●
Tape Feed	o	o	o	o	o	o	o	o	o		o	o	o	o	o	o
4									●	●	●	●	●	●	●	●
5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6																

Shift	T	5/8	Z	(	L		W	1/4	H		Y	3/4	P	?	Q	
Unshift	t	5	z	)	l	Em Space	w	2	h	Em Leader	y	6	p	0	q	En Leader
1		●		●		●		●		●		●		●		●
2			●	●			●	●			●	●			●	●
3					●	●	●	●					●	●	●	●
Tape Feed	o	o	o	o	o	o	o	o		o	o		o	o	o	o
4									●	●	●	●	●	●	●	●
5																
6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Shift	O	&	B		G	:			M		X	1/8	V			
Unshift	o	9	b	Upper Rail	g	;	Shift	Lower Rail	m	Period	x	1	v	Quad Center	Unshift	Rub Out
1		●		●		●		●		●		●		●		●
2			●	●			●	●			●	●			●	●
3					●	●	●	●					●	●	●	●
Tape Feed	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
4									●	●	●	●	●	●	●	●
5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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PROGRAM DECODE FOR CLUE CHART

TYPE OF PROGRAM STEP		EXAMPLES	PROGRAMMERS LANGUAGE
is	Immediate Subtract	(Reg 36) - (170) = (Reg 36)	is36,170
ic	Immediate Compare	(Reg 36) - (255)	ic36,255
ia	Immediate Add	(Reg 36) + (255) = (Reg 36)	ia36,255
it	Immediate Transfer	(Reg 36) = (0)	it36,0
rs	Register Subtract	(Reg 36) - (Reg 2) = (Reg 36)	rs36,2
rc	Register Compare	(Reg 36) - (Reg 2)	rc36,2
ra	Register Add	(Reg 36) + (Reg 2) = (Reg 36)	ra36,2
rt	Register Transfer	(Reg 36) = (Reg 2)	rt36,2
bc	Byte Compare	(Reg 36 Ind) - (Reg 2)	bc36,2pb (b=bump)
bt	Byte Transfer	(Reg 36 Ind) = (Reg 2 Ind)	bt36,2pqb (p = Addr. 2 Ind) (q = Addr. 1 Ind)
ju	Jump Uncond W/O Link	(Jump to 506 Unconditionally)	ju506
ju	Jump Uncond & Link	(Jump to 506 and link)	ju506 l
jh	Jump on Hi	(Jump to 506 on hi)	jh506
jl	Jump on Lo	(Jump to 506 on lo)	jl506
je	Jump on Equal	(Jump to 506 on equal)	je506
jn	Jump on Unequal	(Jump to 506 on Unequal)	jn506
ne	Incremental Jump on equal	(Jump backward 8 if 5th bit of Reg 56 is on)	ne5,56,8
		(Jump forward 8 if 5th bit of Reg 56 is on)	ne5,56,8a (a=add)
nn	Incremental Jump on not equal	(Jump backward 8 if 5th bit of Reg 56 is off)	nn5,56,8
		(Jump forward 8 if 5th bit of Reg. 56 is off)	nn5,56,8a
cr	Program Control	(Reset 5th bit in Reg 16)	cr5,16
ce	Program Control	(Preserve 5th bit in Reg 16)	ce5,16
cs	Program Control	(Set 5th bit in Reg 16)	cs5,16
in	Input	(Input from device # to Reg 6)	in#,6,
ot	Output	(Output to device # from Reg 6)	ot#,6,
		(Output to device # from Reg 6 Ind)	ot#,6q (bump is auto)
px	Prefix	Add 64 to p address of following P.S.	px,p
px	prefix	Add 64 to q address of following P.S.	px,q
px	prefix	Add 64 to both p & q Addresses of following P.S.	px,pq

DEVICE CODES

INPUT
1 PT Reader
2 MT Reader RH Sta
7 Control Panel
10 MT Reader LH Sta

OUTPUT
0 Translator
2 MT Reader LH Sta
4 T.T.R.
6 MT Reader RH Sta
7 Control Panel

X & Y SWITCH & DRIVER CHECK

				Card				Card				Card			Card	Byte
1				D-5				C-5				B-7			A-7	0
2			Y8	A-4			Y4	C-5			Y2	B-7		Y1	A-7	139
3		Y9		D-5		Y5		C-5		Y3		B-7	Y7		A-7	340
4		Y9	Y8	A-4		Y5	Y4	C-5		Y3	Y2	B-7	Y7	Y1	A-7	479
5	Y10			D-5	Y6			B-5	Y11			B-6				1568
6	Y10		Y8	A-4	Y6		Y4	B-5	Y11		Y2	B-6				1706
7	Y10	Y9		D-5	Y6	Y5		B-5	Y11	Y3		B-6				1844
8	Y10	Y9	Y8	A-4	Y6	Y5	Y4	B-5	Y11	Y3	Y2	B-6				1982
	X DR.				X SW.				Y DR.				Y SW.			

NOTE: A binary decode of the Y Latches turned on will indicate the Byte Addressed.

	Y11	Y10	Y9	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
Binary Value	1024	512	256	128	64	32	16	8	4	2	1

Place the Edit Switch in the Address position. Push the clear button. Place the Edit Switch in the Data position. Turn all eight bits on and off. This completes the test on line one and checks X DR. 1, X SW. 1, Y DR. 1 and Y SW. 1. Place the Edit Switch in the Address position. Load the Y's as indicated on line two. Place the Edit Switch in the Data position. Turn all eight bits on and off. This checks X DR. 2, X SW. 2, Y DR. 2 and Y SW. 2. Continue until all eight checks have been made and note any failures. If a failure occurs (EXAMPLE: Line 4 fails), this indicates a bad byte or one of the switches or drivers on that line is bad. Further isolation can be accomplished by a combination of Y latches that will use one suspected bad switch or driver with three known good ones. This will also address a different byte. Continue this until all four suspected bad ones have been check. If they all prove good, the byte is bad. If one proves bad, the card that develops this signal is listed to the right of each chart on the line with the Switch or Driver. (EXAMPLE: X Switch 4 is bad. X Switch current 4 is developed on card C-5. Change this card.)

The above check will work unless the bad card is in a position that effects the address of the P.S.A.R. THe machine uses the highest numbered Switches and Drivers to address the P.S.A.R. (X DR. 8, X SW. 8, Y DR. 8 and Y SW's. 3 & 4). These signals come from cards A-4, B-5, B-6 and A-7 respectively. If the failure effects the P.S.A.R., these four cards should be traded, one at the time, with another card such as C-5 until you can address the P.S.A.R. and therefore find the bad card.
If failure is expected in the expanded memory (Y DR. 9, X DR. 9, X DR. 10) replace card B 3/4 (P/N 5807845).

SEQUENTIAL DIAGNOSTICS

Trouble shooting electronic problems in the processor may be done by a sequential set of checks very similar to those presently in the Customer Engineer's reference manual.

There is a need for a sequential check which will reduce the diagnostic time, have an ease of usage, and pinpoint card failures rather than a group of possible trouble areas. Running the Program Step Check Program (PSCP) or the Memory Check Program (MCP)requires a great deal of the machine hardware to be in working order. It is impossible to pinpoint the failure of a basic processor function with these programs.

The primary checks of this diagnostic aid are made by using the keyboard and interpreting the light displays. Not only do proper light displays indicate proper operation, but improper displays are clues to the causes of failures. When the primary checks are correctly complete, the PSCP and MCP may be used with clue charts. The cause of a failure in the secondary checks may be determined from one of the manual program checks, and it s clue chart.

The diagnostics call out cards to replace or signals to investigate. The checks do not cover every electronic failure which can occur. In most cases a complete check with the diagnostic will indicate the trouble. Failures having certain similarities are caused by the same card or card group. The total time required for primary checks is less than four minutes when failures are not encountered.

I. No Power

A. Check fuses, line power, and power supply cables and connectors.

Check for voltage on rectifiers

Check for tight board connectors

B. No reset light on, or cannot get out of reset

Voltage ref E5,6

Light logic K3,4

Oscillator K5,6

Clock G5,6

Substitute light 11

C. Light display other than reset light when power is turned on

Inhibit read H5,6

Light logic M3,4

Light logic . . . . K3,4 *

Light logic . . . . L3,4 *

* Interchangable cards

II. Check oscillator and clock logic

A. With the clock control switch in WORD position and the machine in reset, use the step button and count binarily through 1-9 time.

1. Word time improper stepping

1-time counters	F5,6
1-time counters	H3,4
Permute	E3,4

2. Hang up in 1-9 time when stepping through word times

Set 9	H3,4

B. With the clock control switch in the BIT position, use the step button to check the bit time counter.

1. Bit time improper stepping

Clock	G5,6
Oscillator	K5,6

C. No light in CE aid positions or same light display in more than one position; for instance, same display in both DATA & ADDRESS positions.

Step	J1,2
—Auto & Step	E5,6
—Aid	L5,6

D. Two display buttons indicate the same display or the same lights on in address and data position.

Aid	L5,6

III. Other checks with the reset light on

A. With clock control switch in AUTO, and edit switch in EDIT

1. Depress Display 4: Only Ready & Q buf 2 lights should be on.

Bump Strb	G5,6
Q buf res	G5,6
Ready	J3,4
Q buf	B1,2
Load Q buf 2	H5,6

Display 4 shows Multiplex light on (before rocking power switch to reset) in AUTO & DATA switch positions.

Begin Prog. Step	F5,6

2. Depress Display 3: Inhibit light should be on. (—Low and Eq may be on or off)

—Output	K5,6
Inhibit	J3,4

3. Depress Display 2: Only Reset light on

Busy	J3,4
Output Lths	J5,6

4. Depress Display 1: Only Reset light on

Latched Y's	D3,4
Latched Y's	C6,7

B. With clock switch in AUTO, and edit switch in PROCESS

1. Depress Display 3:Inhibit light off (—Low and Eq may be on or off)

   Input F5,6

   Pre Inh & Inh J3,4

IV. P buffer and Output latch check

With the reset light on place the clock control switch in the AUTO position and the edit switch in the DATA position.

Depressing keybuttons 3 through R will cause a corresponding light indication. The light will be on only as long as the keybutton is depressed. Stopping the clock by holding the step button after depressing a keybutton should cause the light to remain on.

NOTE: With the edit switch in the DATA position, display 2 is up. the clock is running and keyboard signals are active. The P buffers are reset by the running of the clock; therefore, entries cannot be maintained unless the step button is depressed.

KEYBUTTON	3 4 5 6	7 8 9 R
P BUFFER	4 3 2 1	4 3 2 1
BIT TIME	5/8	1/4

A. If a failure occurs check:

   Output latches J5,6

   Keyboard J1,2

   Keyboard J3,4

   P buf 2&4 . . . . G3,4

   P buf 1&3 . . . . F3,4

B. HINTS:

1. If lights remain on when keybuttons are released

   Output Ith res J3,4

2. If lights do not remain on when step button depressed or a single light is on continuously

   Output Iths J5,6

3. Light failure corresponding to keybuttons 3&7 or 5&9

   P buf 2&4 . . . . G3,4

4. Light failure corresponding to keybuttons 4&8 or 6&R

   P buf 1&3 . . . . F3,4

V. Test of Y–Latches and memory selection circuits with machine out of reset (Power switch rocked to reset position; reset light out). Run X & Y SW and DR. Check.

A. Failure to clear old address.

1.

–Res Y's	H5,6
–Inh read	H5,6
–Res buf	G5,6
Latched Y's	D3,4
Latched Y's	C6,7

Y11 Y10 Y9	Y8 Y7 Y6 Y5	Y4 Y3 Y2 Y1
GROUP III EVEN	GROUP II ODD	GROUP I EVEN
BIT GROUPS		

2. Hint: Failure to clear the same bit in consecutive bit groups. Exmp: Y1,Y5,Y9; Y2,Y6,Y10

Q buf	B1,2
Q buf	C1,2
Accum or Curr Scr	F3,4
Accum or Curr Scr	G3,4

3. Hint: Failure to clear the same bit in even or odd bit groups. Exmp. Y1&Y9,Y2&Y10, or Y4 through Y8 i.e., Y4, Y5, Y6, Y7, or Y8.

Sense inhibit	B1,2
Sense inhibit	C1,2

4. Hint: Failure to clear an entire bit group with the edit switch in the ADDRESS position. (Data can be entered)

Suspect memory driver cards

GMS . . . . 7 interchangable

NOTE: Symptoms should change when these cards are interchanged if one is the cause of failure.

Use Switch & Driver Check.

5. Hint: Failure to clear an entire bit group and the same group display in ADDRESS and DATA positions of the edit switch.

Bit Group I ReWo	D3,4
Bit Group II RoWe	D3,4

B. Failure to load some Y's

1.

Y Iths or decodes	D3,4
Y Iths or decodes	C6,7

2. Hint: Failure to load the same bit in consecutive bit groups. Exmp. Y2,Y6,Y10

   Q buf B1,2

   Q buf C1,2

   Accum or Curr scr F3,4

   Accum or Curr Scr G3,4

3. Hint: Failure to load the same bit in even or odd bit groups.

   Sense inhibit B1,2

   Sense inhibit C1,2

C. Failure to load any Y's and latch lights in edit ADDRESS position.

1. Hint: Failure to also load any data

   Voltage ref E5,6

   P buf Wr Control H3,4

   Curr Scr X&Y logic G5,6

   Sense Amp Strobe D6,7

2. Hint: Data can be loaded

   Load Y's H5,6

   Sel Mem Spc C6,7

D. Hints of Y latch test

1. Blinking 11 lights in address position, and 8 lights in DATA position

   Sense Amp Strobe D6,7

2. PSAR address correct---Switch to data---IF

a. All 8 bits on

   —Sel A Word E3,4

   Memory decodes . . C6,7

b. All but Y4 on

   Inhibit read H5,6

c. All 8 bits on (no data can be entered in register zero)

   Sel Mem C6,7

d. No data in PSAR

   Sel Mem Upper . . E3,4

e. Y1 must be loaded before any other Y's (address bumps to zero)

   Sel PSAR E3,4

3. If Y's can be cleared and then all loaded, switch the edit switch to the DATA position. Only Y1,Y2, and Y3 lights should remain on.

    a. If Y4 is also on, check I-0 reset of Q buffer 4.

    b. If a single bit fails to load or clear run the memory check program (MCP).

VI. Operational Code Check

Enter all bits in the even and odd bytes of a register. Re-address the even byte. Place the clock switch in the PROGRAM STEP & PROCESS position. Depressing display 3 should cause an indication that all operational codes are loaded. Repeat this procedure with the register clear of bits.

A. All op codes failed to load or reset

    1. Begin prog step F5,6

        Load op codes H5,6

B. Some op codes fail to load or reset

    1. Operational codes J5,6

VII. Check Tape Functions

A. Tape cannot be loaded or searched properly

    1. Check reader driver cards and +48 volt fuse and 9 pos. power plug.

    2. Check processor functions necessary for loading

        Mag drivers H1,2

        Incr&MT Ctr F1,2

        Load&Search logic K1,2

    3. Check +48 volt magnet circuits, solenoids, and switches

B. Continuous cycling

    1. Cycle clutch magnet logic

        MT CDE, Bits G1,2

        MT BIT FI,2

    2. Check read head signals

VIII. Program Step Checks

Run the PSCP; in case of failure, run a manual program step and check permute and program step logic.

A. Multiplex: Garbaged printout after multiplex operation is finished or no multiplex.

1. —Halt J5,6

   Multiplex J3,4

   Check photo cells in printer

2. Hint: Output during a function

   Carrier feedback L1,2

   Photo cells

B. Translator:Dropping characters or no translator cycle

1. Des out device M3,4

   Xtlr print M1,2

   Sel mags M1,2

C. Program step failures

1. Taken K5,6

   —Low & Equal K5,6

   —Immediate E3,4

   Jump E3,4

   Arith Op E3,4

   Prog control E3,4

   —Imm Ext C6,7

   —Incr Jump Res Y's C6,7

   —Prog control H3,4

   Input F5,6

   Output K5,6

   —Inp & —Out H3,4

   Add&—Add H5,6

2. Failure of program control steps, (PSCP failure)

   Sample bit pos G3,4

   Sample bit pos F3,4

   Sample bit time L5,6

MANUAL ENTRY DIAGNOSTICS

General Information

These diagnostic program steps are designed to enable the CE to manually check the electronics of the CCU. They may be used in conjunction with or in lieu of the regular Diagnostic Precon Tape. They will be especially helpful in those instances where a machine problem prevents the PSCP or MCP being loaded or run long enough to provide a valid failure indication.

One of the disadvantages of the present PSCP and MCP is the difficulty understanding how the CCU is being checked. An effort was made here to keep the Manual Entry steps as simple as possible and still provide a valid check. It will be advantageous for the CE to become thoroughly knowledgeable of these steps. He should enter and run each routine on a properly functioning MT/SC until each test is fully understood. Once the purpose and method of each routine has been understood, it will be easy to alter these steps if necessary to suit the problem he is trying to diagnose. As an example – INPUT CONTROL PANEL, OUTPUT LITES may be easily changed to Input Control Panel, Output Translator; or Input Tape Reader, Output Lites etc. Another example using the BYTE TRANSFER/COMPARE/BUMP program: In its' present form an entry is made through the control panel to register 22 by depressing a console key (3 thru R) and this single bit is byte transferred to register 26 and output to the lites. If it is desired to use more than one bit at a time, address register 22 and enter the data wanted. Then start the routine in program step 4.Because the steps are simple, they are also flexible.

Manual Entry Procedure

A new procedure is also introduced allowing faster entry of the manual program steps. This procedure may be used on any existing program step or character configuration by converting the binary bit to keybutton value.

To enter a program using this procedure, address the first program step byte (after clearing previous data) and enter the program step using the keybuttons specified for each byte. Keybuttons 3 through R correspond to the 8 bits of data that may be entered. The zero keybutton is used for a blank byte (all zeros) so the entry sequence of "enter data–depress start" is not interrupted. For a comparison of this method and our present method the entry of the initial loader (bootstrap) is shown.

Byte	Present Method	New Method
40	0000 0000	0
41	0000 0000	0
42	0000 0010	9
43	0001 1001	67R
44	0000 0011	9R
45	0111 1010	45679
46	0010 1010	579
47	0000 0000	0

This method is much easier to remember at a quick glance and provides an excellent means of communicating programs via telephone.

Hint: When it becomes necessary to turn the machine off after the program has been entered, place the EDIT switch in the Address position prior to turning the machine back on. This will prevent destroying the entered program.

Operation

Basically the Manual Entry Diagnostic program steps will operate in a "loop" and may be run with the CE control switches in the AUTO and PROCESS positions. However, they will not necessarily repeat the entire program sequence automatically. Therefore most of these routines should be run with the CE switches in the PROGRAM STEP and PROCESS positions, depressing DISPLAY 1, and observing the program step sequence to see if the steps are performed in the proper order. The recommended run procedure for each routine is given under the "NOTES" section of each but may be varied to suit individual situations.

If the machine performs the program steps in the proper order, ie,0,2,4,6,0,2,4,6, etc. it can usually be assumed each step performed correctly. However, since this assumption is not always absolute, a secondary check may be made to determine if the working registers used actually contain the correct information at the end of a given routine.

When a failure is detected, the routine will "hang up" in a program step which is an unconditional jump to itself. When this occurs, the faulty step may be analysed further in the WORD and BIT switch positions. Refer to the "Program Step Failures" hints in the SEQUENTIAL DIAGNOSTICS section or to the Instruction Manual material.

MEMORY CHECK PROGRAM

P.S.	CODE	EXPLANATION
0	BT16,18p	Byte transfer data in R18 to byte address in R16, no bump.
2	RC20,16	Check if address data in R16 has reached 2040.
4	JL 22	Jump to PS 22 when highest byte (2041) has been checked.
6	BC16,18p	Check byte in memory against data transferred. Should be equal.
8	JE 12	Jump to PS 12 if compare step set equal.
10	JN 10	Hang up here if JE step failed to jump.
12	IA16,1	Add 1 to byte address for next cycle.
14	JU 0	Repeat cycle, testing next higher byte.
16	Data	Address of byte being tested (26–2041).
18	Data	Data transferred to each byte (any number 0–255).
20	Data	Address of highest byte to be checked less 1 (2040).
22	IT16,26	Transfer first byte address to R16.
24	JU 0	Repeat cycle from lowest to highest byte.

TO ENTER P.S. KEY BYTE	DATA
0	69R
1	458
2	6
3	468R
4	689
5	5
6	69R
7	48
8	78R
9	5
10	79
11	56
12	R
13	3458
14	0
15	0
16	679
17	0
18	3456789R
19	0
20	34567
21	89R
22	679
23	34568
24	0
25	0

NOTES

This program checks the bytes in memory by transferring the data in Byte 18 to the Byte whose address is in R 16 (26-2041). Byte 18's data may be altered as the CE desires.

The program should normally be started in P.S. 22 and run with the switches in the AUTO and PROCESS positions. The data in R 18 will be byte transferred by Bytes 26 through 2041. The program will repeat this transfer process over and over until stopped by an error or by the CE. To observe the progress of the program depress Display 1 and the Y's will be displayed to the lights. Each time Y 11 brightens and then dims, the complete memory has been tested once. This takes about 7 seconds. You will have to remove the light caps in order to see this indication because the lights will be very dim.

In the event of a failure, the program will hang up in P.S. 10 (Y2 & Y4), and R 16 can be checked for the address of the byte that failed. Be sure and check the "top half" (Byte 17) for the complete address. If you want to test for additional failures above the byte indicated, change the data in R 16 to the next higher byte and start the program in P.S. 0.

As entered, the data in R 18 is 255 (all 1's). If no failure occurs after a few minutes run stop the program by moving the edit switch to ADDRESS. Change the data in R 18 to zero and restart the program in P.S. 22. This will completely clear memory. If no failure occurs try different bit configurations in R 18. The worst conditions for noise on the memory lines are either the first four bits (binary 15) or the second four bits (binary 240) in R 18.

INPUT CONTROL PANEL – OUTPUT LITES

P.S.	CODE	EXPLANATION
0	IN7,16	Depress key, set –Equal;No entry, set Equal.
2	JE 0	Jump to input step if no entry.
4	OT7,16	Output R16 to lites.
6	JU 0	Repeat. Lite will remain on until another entry.

TO ENTER P.S. KEY BYTE	DATA
0	36
1	679R
2	R
3	5
4	36
5	69R
6	0
7	0

NOTES

This program checks the control panel switches and corresponding light output.

This program should be run with the switches in the AUTO and PROCESS positions – starting the program in P.S. 0. Depressing any keybutton (3 thru R) will cause it's corresponding light to come on. Depressing any keybutton (Start thru 2) will cause the light to go off since only the lower 8 bits are displayed to the lights.

With the Clock Control switch in PROG. STEP and Display 1 depressed, the program will step:0,2,0,2,etc., until a keybutton is depressed during P.S. 0. Then the program will step 0,2,4,6,0,2,0,2 etc. If a keybutton (3 thru R) is held depressed as P.S. 0 is stepped through a corresponding output latch will be set during P.S. 4. This can be seen by depressing Display 2.

JUMP (–LO,EQ)

P.S.	CODE	EXPLANATION
0	RC0,0	Compare Reg 0 to Reg 0 should set –LO and EQ.
2	JL 2	Should ignore this jump because –LO is on.
4	JN 4	Should ignore this jump because EQ is on.
6	JE 10	Should take this jump because EQ is on.
8	JU 8	Hang up here if JE fails to jump.
10	JH 6	Should take this jump because –LO is on.
12	JU 12	Hang up here if JH fails to jump.

TO ENTER P.S. KEY BYTE	---- DATA	NOTES
0	0	This program checks jump conditions of the –Low & Equal latches. Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,10, 6,10, 6,10 etc. A failure will cause the program to hang up in P.S. 2, 4, 8 or 12 depending upon the failure.
1	46	
2	9	
3	5	
4	8	
5	56	
6	79R	
7	5	
8	7	
9	0	
10	89R	
11	6	
12	78	
13	0	

JUMP (–LO,–EQ)

P.S.	CODE	EXPLANATION
0	RC0,12	Should set –LO,–EQ
2	JL 2	Should ignore this jump because –LO is on.
4	JE 4	Should ignore this jump because –EQ is on.
6	JH 10	Should take this jump because –LO is on.
8	JU 8	Hang up here if JH fails to jump.
10	JN 6	Should take this jump because –EQ is on.
12	JU 12	Hang up here if JN fails to jump.

TO ENTER P.S. KEY BYTE	---- DATA	NOTES
0	78	This program checks jump conditions of the –Low and –Equal latches. Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,10, 6,10 6,10 etc. A failure will cause the program to hang up in P.S. 2, 4, 8 or 12 depending upon the failure.
1	46	
2	9	
3	5	
4	8R	
5	5	
6	79R	
7	6	
8	7	
9	0	
10	89	
11	56	
12	78	
13	0	

JUMP (LO,–EQ)

P.S.	CODE	EXPLANATION
0	RC8,0	Should set LO,–EQ.
2	JE 2	Should ignore this jump because –EQ is on.
4	JH 4	Should ignore this jump because LO is on.
6	JN 10	Should take this jump because –EQ is on.
8	JU 8	Hang up here if JN failed to jump.
10	JL 6	Should take this jump because LO is on.
12	JU 12	Hang up here if JL failed to jump.

TO ENTER P.S. KEY BYTE	---- DATA	NOTES
0	0	This program checks jump conditions of the Low and –Equal latches. Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,10, 6,10 6,10 etc. A.failure will cause the program to hang up in P.S. 2, 4, 8 or 12 depending upon the failure.
1	469	
2	9R	
3	5	
4	8R	
5	6	
6	79	
7	56	
8	7	
9	0	
10	89	
11	5	
12	78	
13	0	

IMMEDIATE ARITHMETIC

P.S.	CODE	EXPLANATION
0	IT16,255	Transfer 255 to Ref.16
2	IA16,1	Add 1 to Ref. 16
4	IS16,255	Subtract 255 from Reg. 16
6	IC16,1	Compare 1 to Reg. 16
8	JE 0	Should jump because EQ is on
10	JU 10	Hang up here if JE failed to jump.

TO ENTER P.S. KEY BYTE ---- DATA		NOTES
0	3456789R	This program checks the four functions of Immediate Arithmetic. Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,8, 0,2,4,6,8 etc. A failure will cause the program to hang up in P.S. 10.
1	34568	
2	R	
3	3458	
4	3456789R	
5	348	
6	R	
7	3468	
8	R	
9	5	
10	79	
11	56	

DIRECT ARITHMETIC

P.S.	CODE	EXPLANATION
0	RT16,12	Transfer 255 in R 12 to R 16.
2	RA16,14	Add 4080 in R 14 to R 16.
4	RS16,12	Subtract 255 in R 12 from R 16.
6	RC16,14	Compare 4080 in R 16 to 4080 in R 14. Set –LO,EQ.
8	JE 0	Should jump to 0 since EQ is on.
10	JU 10	Hang up here if JE failed to jump.
12	DATA	255
14	DATA	4080

TO ENTER P.S. KEY BYTE ---- DATA		NOTES
0	78	This program checks the four functions of Direct Arithmetic. Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,8, 0,2,4,6,8 etc. A failure will cause the program to hang up in P.S. 10.
1	4568	
2	789	
3	458	
4	78	
5	48	
6	789	
7	468	
8	R	
9	5	
10	79	
11	0	
12	3456789R	
13	0	
14	3456	
15	789R	

INCREMENTAL JUMP

P.S.	CODE	EXPLANATION
0	NN1,16,6A	If first bit R16 is off, jump to PS 8.
2	JU 2	Hang up here if NN1 failed to jump.
4	NE2,16,6A	If second bit R16 is on, jump to PS 12.
6	JU 6	Hang up here if NE2 failed to jump.
8	NN3,16,6	If third bit R16 is off, jump to PS 4.
10	JU 10	Hang up here if NN3 failed to jump.
12	NE4,16,14	If fourth bit R16 is on, jump to PS 0.
14	JU 14	Hang up here if NE4 failed to jump.
16	DATA	Contains binary 10.(first four bits 1010).

TO ENTER P.S. KEY

BYTE	DATA
0	89
1	35
2	9
3	0
4	389
5	357
6	89
7	0
8	89
9	3R
10	79
11	0
12	3789
13	37R
14	789
15	0
16	79
17	0

NOTES

This program checks the Incremental Jump conditions both forward and backward with bit conditions both "on" and "off".

Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,8,4,12, 0,8,4,12 etc. A failure will cause the program to hang up in P.S. 2, 6, 10 or 14 depending upon the failure.

PROGRAM CONTROL

P.S.	CODE	EXPLANATION
0	IT16,9	Set up R16 (1001 in first four bits).
2	CR1,16	Reset first bit of R 16.
4	CS3,16	Set third bit of R 16.
6	CE4,16	Sample fourth bit R 16, do not change.
8	IC16,12	R 16 should contain binary 12, set –LO,EQ.
10	JE 0	Repeat cycle if correct.
12	JU 12	Hang up here if JE failed to jump.

TO ENTER P.S. KEY

BYTE	DATA
0	7R
1	34568
2	6R
3	56
4	6R
5	567R
6	346R
7	56R
8	78
9	3468
10	R
11	5
12	78
13	0

NOTES

This program checks the Program Control setting, resetting and sampling of bits within one of the special registers (R 16).

Start the program in P.S. 0. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, the program should step: 0,2,4,6,8,10, 0,2,4,6,8,10 etc. An error will cause the program to hang up in P.S. 12.

MULTIPLEX OUTPUT
(Repeat Playback Of Same Line)

P.S.	CODE	EXPLANATION
20	IT0,186	Transfer addr. of first output byte to R 0.
22	OT8,0q	Multiplex output from R 0 indirect (186).
24	OT0,20	Output R 20 direct (used to check Inhibit).
26	JU 20	Repeat cycle.

TO ENTER P.S. KEY BYTE	DATA
20	35679
21	3456
22	4
23	68
24	68
25	6
26	68
27	0

NOTES

This program checks Multiplex Output to the printer and the Inhibit function of the electronics. This is the same program as the "Playback Program" as published previously in the CE publications.

A good Precon must be in memory. Set up the machine, load and run a tape containing the desired output copy. When the line desired has been read into memory, stop the machine by depressing the Line Stop button.

Enter the Multiplex Output program beginning in Register 20. Start the program in P.S. 20. With the Clock Control switches in the AUTO and PROCESS positions, the last line printed will play out repetively, using multiplex for the line, followed by a direct output program step. If Display 4 is held depressed the Multiplex Light will go out momentarily during the carrier return. Display 2 will indicate the Output Latches changing.

To stop the program, move the Edit switch to ADDRESS.

BYTE TRANSFER/COMPARE/BUMP

P.S.	CODE	EXPLANATION
0	IN7,22	Depress key,–EQ; No entry, EQ.
2	JE 0	Jump back to input step if no entry.
4	BT24,20pqb	Byte trans. entry in R22 to R26,bump R24 & R20.
6	IS20,1	Remove bump from R 20.
8	IS24,1	Remove bump from R 24.
10	BC24,20pq	Compare entry (R22) with R26.
12	JE 16	Jump if entry transferred correctly.
14	JU 14	Hang up here if JE failed to jump.
16	OT7,26	Output entry in R26 to lites.
18	JU 0	Repeat cycle for next entry.
20	DATA	Binary 22 (Indirect addr. of input reg.)
22	DATA	Binary number corresponding to entry.
24	DATA	Binary 26 (Indirect addr. of output reg.)
26	DATA	Binary number (entry transferred from R22).

TO ENTER P.S. KEY BYTE	DATA
0	3689
1	679R
2	R
3	5
4	468R
5	45689
6	R
7	348R
8	R
9	3489
10	468R
11	489
12	6R
13	5
14	789
15	0
16	3679
17	69R
18	0
19	0
20	689
21	0
22	0
23	0
24	679
25	0
26	0
27	0

NOTES

This program checks Byte Arithmetic operations – Transfer, Compare and Bump.

Start the program in P.S. 0. With the switches in the AUTO and PROCESS positions a light will be turned on corresponding to any keybutton (3 thru R) depressed. With the Clock Control switch in the PROG. STEP position and Display 1 held depressed, this program will step: 0,2,0,2 etc., unless a keybutton (3 thru R) is held depressed as you step through P.S. 0. Then the program will step: 0,2,4,6,8,10,12,16,18,0,2,0,2 etc. An output latch will be turned on by P.S. 16 to correspond to the keybutton depressed. This can be observed by depressing Display 2. An error will cause the program to hang up in P.S. 14.

DIAGNOSTIC TAPES
K–104 LEVEL

GENERAL INFORMATION

The K–104 Diagnostic Tapes are an improved version of the previous CE Diagnostic Tapes K–101/K–102 level. Several improvements have been incorporated plus additional checking features have been added. The part numbers have not been changed, i.e. 9900975 and 9900978; however, the 9900978 (left tape) is used as a "left" tape only for checking the merge feature or when checking head alignment on the left station. The leader portion of this tape contains the standard MT/ST head alignment sections "A" and "B". The machine check-out portion of the diagnostic tapes has been modified to include a series of tests for the Composer and a series of pre-recorded copy to be played back using the various Precons. In addition to the PSCP, these tapes contain a slightly modified MCP, a new Playback program, a Ripple program for exercising the Translator and Printer and two new Edit Memory programs (printing or non-printing).

If the Precon has an assigned number, i.e. Edit Memory Printing 266, it may be loaded from "Clear" by keying the precon number. If no precon number is assigned it must be loaded using the INITIAL LOADER.

On the following pages is either a playout example or explanation of each tape by reference code. The examples begin with Reference 1 – Tape 9900975.

DIAGNOSTIC TAPE – 9900975

REFERENCE 0 Search Test consisting of MT/ST "4" and "5" bits. Text explains if machine stopped searching because it read reference code in error. With a good precon in the machine, load tape, search one time, and depress TAPE/START.

REFERENCE 1 – 5 The first five reference codes (Composer checkout) may be run by loading precon 256, 259, 260, or 261 and entering the following:

CLEAR YES – MERGE NO – MODE L – LINE COUNT 1000 – MEASURE 248 – LINE INDENT NO – PARA INDENT NO – LEADER 3 – MIN IW 3 – MAX IW 9 – MAX QUAD 12 – LINE EXPAND (MIN HYP) YES – DEAD KEY NO – TAPE/START.

REFERENCE 6 – 11 See playout example for setup instructions. If you are using a K–103 level precon tape a loss of carrier return (will not convert to space) will result on some projects if CLEAR YES is answered twice.

REFERENCE 12 Edit Memory Printing 266 – The Edit Memory precon may be used to address and edit locations in memory via the normal control panel keys. When the precon is loaded, all control panel lights will be out. The console will be in the ADDRESS mode waiting for a DECIMAL address to be entered. For instance, if you would like to look at byte 352 (beginning of input block – precon 256) key 352 and depress start. The console is changed to the DATA mode and displays the data in byte 352 to the lights. If a printable character results, it will be output to the printer. Each depression of the start key will "bump" the address by 1 and display the next byte to the lights and output to the printer.

To change the data in a byte, depress the "0" key to clear the byte, then enter the new data BINARILY using the 3 thru R keys. The new entry will be displayed to the lights as each keybutton is depressed. Depressing the start key will bump up to the next byte, display its data to the lights and output to the printer etc.

To return to the Address mode, depress the "1" key. The present address will be displayed to the lights (only the low order 8 bits can be displayed - therefore an address greater than 255 will not be completely displayed). The address may be cleared by depressing the "R" key, before depressing START, and a new address may be entered by keying the DECIMAL number of the address and depressing the start key. This depression of the start key will change the console to the DATA mode once again and display the new data to the lights and output to the printer etc.

To return the console to CLEAR for entering another precon – turn the machine off and back on again.

REFERENCE 13 Edit Memory Non-Printing 267 – This precon is identical to the Edit Memory Printing precon except each byte is displayed to the lights only. No data is output to the printer. A special procedure is necessary to search to Reference 13 because of the data used in Precon 266 (Ref. 12). If you have searched to Ref. 12 and loaded it, then one additional search will get you to Ref. 13. However, if you are searching THROUGH Ref. 12, several search operations are necessary to get to Ref. 13. These search operations will be very short and it will be evident that the machine is not reading a normal reference code. Continue searching (approx. 6 to 8 times) until a normal sounding reference code is read. This will be Ref. 13.

NOTE: Neither of the Edit Memory Precons will destroy a previously loaded precon (unless of course memory data is changed – Byte 64 and up) as they are loaded into the working register area of memory.

TTR EXPANDED MEMORY: In order to address upper memory, Y 12 and/or Y 13 must be selected. Placing the EDIT switch in PROG. automatically sets Y 12. However, in order to address a register in which Y 13 is needed, the Edit Memory Precon must be loaded. Upper Memory can then be addressed in the same manner as the 16K memory, (Decimal Address at the Control Panel). The ability to address a register in which Y 13 must be used indicates that Y 13 is selected. (Refer to Section 15 of the MT/SC Instruction Manual for register locations.)

NOTE: In Data mode, depression of the "2" key will bump the address by 8. This is true for both the 16K and 23K memories.

PRECON 263 OVERLAY	CLEAR	GRAPHIC FONT	LINE COUNT	STOP ON NEXT REF.	KEY REF. NUMBER	SPECIAL A	SPECIAL B

-a- auto search
-b- backspace
-c- carrier return
-e- stop transfer
-f- feed code
-p- prefix
-s- space
-t- tab
-w- switch code

IGNORE CODES
-g- -h- -i- -j- -k- -l-
-m- -n- -o- -q- -u-

Ref:-p-x-a--a--a--a--a--a--a--a--a--a--a--a--a--a--a--y--y--y--y--y--y--y--y--y--y--y--y--y--y--y-zzzzzzzzzzzzzzzzzzzzzzzzzzzzzz-c-

PRECON
–264–

a	27
b	54
c	23
d	7
e	6
f	29
g	13
h	38
i	26
j	12
k	22
l	39
m	9
n	20
o	43
p	14
q	30
r	11
s	42
t	4
u	21
v	25
w	58
x	5
y	46
z	51
1	1
2	16
3	17
4	35
5	2
6	18
7	3
8	19
9	50
0	34
NP	128
,	31
.	24
?	15
'	62
;	47
]	8
[	10
=	28
LC	45
UC	37
Tab	40
Crn	32
BS	41
Halt	255

DIRECT	MULPLX	UNIQUE	PRINT	NO-PRINT	LINE CT.	RECALL	PRESERVE
0	1	2	3	4	5	6	7

F/N 241-5524-0

DIAGNOSTIC TAPE – 9900978

REFERENCE 0 PLAYBACK PRECON 263 – Several new features have been added to the CE version of the 263 PB Precon. As a result, the operating procedure has been changed.

NEW FEATURES

1. Sequentially numbered reference codes.
2. Sequentially numbered input lines between reference codes.
3. Keyboard entry for stopping playback on the next reference code.
4. Keyboard entry for output line count.
5. Forced carrier return if playback copy exceeds approx. 8" in Red pitch.
6. Input error correction – if ReRead fails to restart, SKIP will cause "&" to print and erroneous character will be skipped. If the tape is blank the console returns to "Clear".
7. A reference code erroneously recorded at the end of an input line, i.e., not preceeded by a carrier return, will not be numbered; however, it will be counted and the input line counter reset to 1. The next properly recorded reference code will be numbered in it's proper sequence.
8. If it is desired to search to a particular reference code for playout, this reference code may be numbered in it's proper sequence by entering the correct number from the control panel.

OPERATION & SET–UP

1. Load Playback precon – prints "263 Loaded!" and "Clear" turned on.
2. Install PB 263 Overlay (Form 241-5524-0).
3. Follow setup lights on overlay:
   - A. CLEAR – Yes or No (Yes restores line count, cancels stop next reference code).
   - B. GRAPHIC FONT – Yes ("No" decision reserved for possible future special font).
   - C. LINE COUNT – Key desired output line count.
   - D. STOP NEXT REF. CODE – Yes or No
   - E. KEY REF. NO. – Enter desired number (see item 9 above).
     Note: If starting at beginning of tape, reference codes will automatically be numbered from 1 – bypass this entry.
   - F. Enter TAPE/START to begin playout.
   - G. LINE STOP – Entry will cause stop at end of input line only.

NOTE: The "TYPE" key is no longer operative on this level precon for playing out one character at a time. Minimum playout will be one line at a time using the LINE STOP key.

See PB 263 Overlay for definition of playout codes or refer to Operators Training Manuals for detailed explanation of codes.

(The "Special" positions are reserved for future use. At the present time only the "A" light will be operative – however no entry will be accepted at this position. Bump past or Tape/Start.)

REFERENCE 1 RIPPLE PRECON 264 – The Ripple Precon contains two character tables arranged in seeker sequence for exercising the Translator and Printer. The first table is a PRINTING table, the second a NO–PRINT table.

In addition, provision has been made to enter a unique table of your choosing by keying the DECIMAL value of each character or function. The unique table is stored in Bytes 135 – 545 (410 possible characters) and may be preserved and recalled as required.

All tables are available for output in either Direct or Multiplex output. A line count value may be entered to limit the exercise.

When the Precon has loaded, the "Clear" light will be turned on. Set one tab stop near the left hand margin or depress the tab locate key as the tab seeker will be pulled in sequence.

OUTPUT INSTRUCTION (FROM "CLEAR")

1. Direct Output – Key 0/Start
2. Multiplex Output – Key 1/Start

TO OUTPUT NO–PRINT TABLE (FROM "CLEAR")

1. Select No-print table – Key 4/Start
2. Follow OUTPUT INSTRUCTION 1 or 2

TO OUTPUT PRINTING TABLE (FROM "CLEAR")

1. Select Printing Table
   - a. U. C. – Key 3/Start OR
   - b. L. C. – Key 3/Start – 8/Start
2. To OUTPUT To Translator
   - a. Direct – Key O/ST
   - b. Multiplex – Key I/ST

TO ENTER A UNIQUE TABLE (FROM "CLEAR")

1. Key 2/Start – Red Setup light will be turned on.
2. Key the DECIMAL value of the character or function and Start. The start makes the entry into memory. If an incorrect entry is made, prior to depressing start, depress REKEY and re-enter the correct character or function. After start has been depressed the BINARY character configuration will be displayed to the lights.
3. After the last character of the unique table has been entered (this will usually be a carrier return) key 255 (UC Halt Code) and Start. This will terminate the unique entry and turn on the clear light.
4. To output the unique table follow OUTPUT INSTRUCTION above.
5. For spaces of less than 9 units add 128 to the value of a character having the desired escapement.

TO PRESERVE THE UNIQUE TABLE (FROM "CLEAR")

1. Key 7/Start after entering the Halt code –OR–
2. Stop at the end of the unique table playout using line stop and key 7/Start.

Preserving the table will allow you to select the Print and/or No-print tables and then select the unique table again without re-entry. Also, once a unique table has been preserved, other unique tables may be entered and run without loss of the preserved table. If you choose to preserve another unique table, this may be done by following steps 1 or 2 above; however, the previously preserved table will be lost. Only one unique table may be preserved at a time.

TO RECALL A PRESERVED UNIQUE TABLE (FROM "CLEAR")

1. Key 6/Start
2. To OUTPUT to translator
   a. Direct – Key O/ST
   b. Multiplex – Key I/ST

TO ENTER A LINE COUNT (FROM "CLEAR")

1. Key 5/Start – the light above the "5" keybutton will be turned on.
2. Key a line count value/Start – the Clear light will be turned on.
3. Select a table and follow the OUTPUT INSTRUCTIONS.
4. When the line count value has been reached, the console will stop with the light above the "5" keybutton on.
5. To start again repeat 2 and 3 above.

NOTE: Once a line count has been entered, it must be re-entered or changed each time the machine stops. Otherwise a one line output may result even if you select another table.

REFERENCE 2 – 5 These reference codes are used with the merge test to make the "left" tape compatible (reference code wise) with the right tape. See Merge Test example for set-up instructions. Each of these reference codes is followed by text stating the reference code number, i.e. RC2, RC3 etc.

REFERENCE 6 Merge Text for "Left" tape. See Merge Test for example and set-up instructions.

REFERENCE 7 MEMORY CHECK PRECON 265 – This precon may be used to detect defective cores, diodes, etc. in the memory plane. All cores are checked for worst case conditions. The output of the program is indicated by the control panel lights slowly counting binarily from 1 to 8. Each display lasts approximately 8 seconds. The program will continue cycling until a failure is detected or the line stop button is depressed. Depressing the line stop button will cause the program to stop after completing the 1 to 8 count with all 8 lights on. Depressing START will cause the precon to start cycling again.

By depressing 2,3 instead of 1,6 the entire expanded memory (23K) will be checked in the same manner as the base memory (16K). It will, however, take approximately 38 seconds between light displays until the binary light display of five is reached. Each light display after this will then last approximately 8 seconds.

After running the precon, the initial loader must be used to load another precon.

SET–UP INSTRUCTIONS

Load the MCP - the lights above the 3,4,5 & 6 keybuttons will be turned on. Depress the "1" key, depress the "6" key – the precon will begin cycling.

If a defective core is sensed, the 7th & 8th lights (above the 3 & 4 keybutton) will be turned on in addition to the lights used for the binary counting. The 6th light (above the 5 keybutton) may also be turned on. If the 6th light is off, the address of the defective byte will be in REGISTER 8. If the 6th light is on, the address of the defective byte will be in REGISTER 40.

SER – FEATURE SERVICE AIDS

TAPE MOBILITY

Search Test Tape Mobility SER: At reference code 6 on the Customer's 340 Series precon tape is a search test designed to work in conjunction with the CE diagnostic tape, P/N 9900978. A printout of this search test is located on page 0801 in the Tape Mobility section of the MT/SC Maintenance Diagram Manual. Search to reference code 6 and answer "Clear Yes", Start, Tape/Start and set-up instructions for this search test will print out.

THE INSTRUCTION SEQUENCE SHOULD BE FOLLOWED VERY CAREFULLY.

After running the search test, further check the machine by performing some panel search operations. Especially check panel search to reference code 32 and 64. This completes the check out of the counter circuitry.

NOTE: There are 72 reference codes on the customer's tape.

Panel Search, Tape Mobility SER – Service Aid: When troubleshooting a search problem, it may be desirable to inhibit the control panel from "bumping" out of Panel Search after a panel search operation has completed. Depending on the precon that is loaded, the data in one byte may be changed to accomplish this.

Precon 340 loaded: Key Address 0123579 and change data from 34569 to 579.

Precon 341 loaded: Key Address 01235679 and change data from 345678 to 579.

Precon 342 loaded: Key Address 134578 and change data from 345679 to 579.

Precon 343 loaded: Key Address 134579 and change data from 34567 to 579.

Then Key Address 159 and place the Edit switch in PROCESS. The control panel will now fail to "bump" out of Panel Search after a panel search operation has been completed. Reloading the precon or changing the data back to its original state will allow the MT/SC to operate normally.

RELOAD THE PRECON BEFORE RETURNING THE MT/SC TO CUSTOMER USE.

THIRD TAPE RECORDER

Duplicating Tapes On MT/SC With Third Tape Recorder: A duplicate copy of a tape can be obtained on the Third Tape Recorder by using the Playback Precon 263 and following this procedure:

1. Load Precon 263 (Playback Precon).
2. Load original tape on right station of MT Reader (6310).
3. Load a tape on Third Tape Recorder (6340).
4. Answer each control panel decision with applicable response.
5. Answer SPECIAL A. (SPECIAL ENTRY 1) "YES".

When TAPE/START is depressed, a duplicate tape will be recorded as the output copy is printed. The playback precon printout will occur as usual with numbered reference codes and numbered lines; the numbers WILL NOT be recorded on the duplicate tape.

REFERENCE 8 PROGRAM STEP CHECK PRECON

The program step check program (PSCP) is designed to automate as much as possible the checking of individual program steps. Naturally, some steps must be used in order to load the PSCP, but only a minimum number of steps are needed. Using only the 3 steps of the initial loader (printed on the C.E. panel) we can load the PSCP. To avoid manually checking the three initial loader steps 3 more steps are entered in the processor from the tape to give a visual indication that the tape will load properly.

To use the PSCP, load the diagnostic tape and search to the program step check program. Enter the initial loader from the console's keyboard. After entering Byte 46, switch to process and the tape should load for about 3 seconds and should stop with the light on in the first bit position (over the R keybutton). If the tape loaded and the one bit light comes on, we know that six steps have worked properly and that the rest of the program will load. The six steps thus far checked are:

1. Input from Reader
2. Indirect Transfer with Bump
3. Unconditional Jump
4. Output to Lights
5. Input from Console Keyboard
6. Jump on Equal

The first three steps were used to load the tape. The last three steps are used to indicate that the tape loaded properly. If the first six steps did not operate properly, consult the clue chart at the end of this section. If the first 6 steps operated properly, depress any keybutton on the console and the rest of the PSCP will load using the six steps previously checked. Approximately 82 seconds later the reader will stop reading and the two bit light will come on (over the 9 keybutton).

Every time a control panel button is pushed and the step being checked is working correctly, the next binary number will show on the lights. When a step malfunctions, a light in the sixth, seventh, or eighth bit positions will be on. It is important to make a mental note of the count. If a step being checked causes a gross error destroying the PSCP, the only clue may be the knowledge of which previous step had been working. The binary count will go from 3 to 23 before the Alignment Sequence prints out and light 24 comes on. Any time an error occurs the PSCP CLUE CHART should be consulted. Once a malfunction occurs, it must be fixed and the PSCP reloaded before additional checking can be done.

MANUAL PROGRAM STEP CHECKS

JUMP UNCONDITIONAL CHECK

Enter unconditional jump to Reg. 42 in Reg. 0
Enter Unconditional jump to Reg. 0 in Reg. 42
Start Program by addressing Reg. 0

The program should go into a jump loop after switching the edit switch to process. Depress display 1 button. Y2, Y4 and Y6 lights should glow.

ADDRESS	DATA	
0	0010 1010	Start here
1	0000 0000	
42	0000 0000	
43	0000 0000	

OUTPUT TO THE LIGHTS CHECK

Enter output to the lights from Reg. 8 in Reg. 0
Enter Unconditional jump to Reg. 0 in Reg. 2
Enter 1,2,4, and 8 bit positions in Reg. 8
Start program in Reg. 0

The 1,2,4, and 8 bit lights should light. To check other lights enter the desired bit positions in Reg. 8. Always start program in Reg. 0.

ADDRESS	DATA
0	1000 1000
1	0001 0011
2	0000 0000
3	0000 0000
8	0000 1111
9	0000 0000

INPUT FROM TAPE READER

Enter Input from tape reader RH station to Reg. 8 in Reg. 0
Enter Output to the lights from Reg. 8 in Reg. 2
Enter Unconditional Jump to Reg. 0 in Reg. 4
Load the RH tape into the tape reader
Manually backstep the tape one track (feed code)
Turn on head alignment switch
Start program in Reg. 0

The 4,16, and 32 bit lights should come on (feed code). Turn off head alignment switch. The tape Reader should continue reading with various bit lights going on and off.

ADDRESS	DATA
0	0000 1000
1	0001 1001
2	1000 1000
3	0001 0011
4	0000 0000
5	0000 0000

INPUT FROM CONSOLE KEYBOARD CHECK

Enter Input from console keyboard to Reg. 8 in Reg. 0
Enter Output from Reg. 8 to lights in Reg. 2
Enter Unconditional Jump to Reg. 0 in Reg. 4
Start program in Reg. 0

While holding down the 3, 4, 5, 6, 7, 8, 9, or R console keybutton, its respective light should light. Letting up on the keybutton turns off the light.

While holding down the display 3 button depress any console keybutton except rekey. The equal light should go off and the Inhibit light should turn on

ADDRESS	DATA
0	1000 1000
1	0001 1011
2	1000 1000
3	0001 0011
4	0000 0000
5	0000 0000

JUMP ON EQUAL CHECK

Enter Input from Console Keyboard to Reg. 8 in Reg. 0
Enter Output from Reg. 8 to lights in Reg. 2
Enter Jump on Equal to Reg. 0 in Reg. 4
Enter Unconditional Jump to Reg. 16 in Reg. 6
Enter Unconditional Jump to Reg. 16 in Reg. 16
Start program in Reg. 0

With the machine in process, depress the Display 1 button. The 2, 4, and 8 bit lights should glow faintly. Depress the Display 3 button. Equal should be on. Now, depress any keybutton from the 128 bit position to the 2 bit position. Equal will go off and after releasing the Display 3 button the light above the keybutton depressed will be on. Depress Display 1. The 16 bit position light will be on.

ADDRESS	DATA
0	1000 1000
1	0001 1011
2	1000 1000
3	0001 0011
4	0000 0001
5	0010 0000
6	0001 0000
7	0000 0000
16	0001 0000
17	0000 0000

INDIRECT TRANSFER WITH BUMP CHECK

Enter an Indirect transfer of the data in Reg. 8 to the byte addressed by Reg. 10 in Reg. 0
Enter Unconditional Jump to Reg. 2 in Reg. 2
Enter any data in Reg. 8
Enter Address 12 in Reg. 10
Start program in Reg. 0

Switch to Process. The machine performed one byte transfer, then went into a jump loop at Register 2. Switch the Edit Switch to Address and enter Address 12. The data you installed in Register 8 should be displayed by the console lights with the Edit switch in the Data position. Switch back to Edit Address and address Register 0 again. Switch to Process. Another byte transfer will take place but now the data in Register 8 will have transferred to Byte 13. Address Byte 13 and check the data. It should be identical to Register 8 and Byte 12.

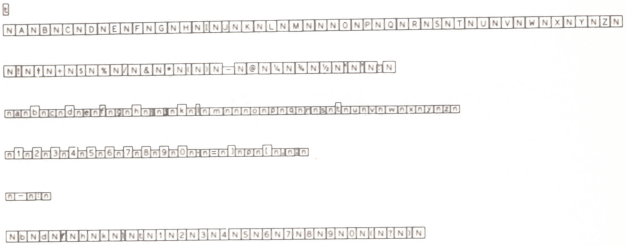
ADDRESS	DATA
0	1000 1001
1	0111 0010
2	0000 0010
3	0000 0000
8 (Data)	0000 1111
9	0000 0000
10	0000 1100
11	0000 0000

This completes the manual program step checks. If each of these 6 steps operates properly, the PSCP should load and operate.

PSCP CLUE CHART

00000000	If the tape reader does not read or if there is no light after first 3 seconds of running PSCP, or if the machine continues to read, start again to make sure there are no human errors in seraching to PSCP and in entering the Initial Loader. If it still will not work, manually check the initial 6 steps (see Manual Checks).
	If there is no light after first 3 seconds of running PSCP but machine stops reading, manually check an output-to-the-lights step (ot7,14).
	If there is no light when in middle of running PSCP, check program step that is checked after last light indication seen.
	If there is no light after 00010111 (23), suspect that direct output-to-printer step (ot0,4,) has not completed or that multiplex step (ot8,8q) is not working.
	The binary light count should be noted while going through the following steps. If a failure is noticed (ex. no lights or extra lights for that binary count) refer to the manual entries involved in the step that would have been OK.
00000001	If light comes on after first 3 seconds of running PSCP and machine stops reading everything is OK to this point.
	If light comes on after first 3 seconds of running PSCP but machine does not stop reading, manually check input-from-keyboard step (in7,2,) to make sure that EQUAL was set. If EQUAL was set, check the jump-on-equal step (je28,).
00000010	If light comes on after 83 seconds of running PSCP and machine stops reading, everything is OK to this point. PSCP is now loaded. If the PSCP loads to light 00000001, it should load to 00000010 since the steps used are similar. If the PSCP does not load to 00000010, manually check bt6, 4pb; bt6, 12pb; bt10, 6pb; bt10, 8pb; ju47 (goes to 46); in2, 2,; bt40, 2pb; ju1726,; ju42,; ot7, 16,; in7,2,; je66,;.
00000011	The jump-on-equal step (je) is OK.
00000100	The jump-on-not-equal step (jn) is OK.
00000101	The jump-on-high step (jh) is OK.
00000110	The jump-on-low step (jl) is OK.
00000111	The immediate-compare step (ic) is OK.
00001000	The immediate-transfer step (it) is OK.
00001001	The immediate-add step (ia) is OK.
00001010	The immediate-subtract step (is) is OK.
00001011	The register-compare step (rc) is OK.
00001100	The register-transfer step (rt) is OK.

00001101	The register-add step (ra) is OK.
00001110	The register-subtract step (rs) is OK.
00001111	The byte-transfer step (bt) is OK. bt12, 8qb is not tested.
00010000	The byte-compare step (bc) is OK.
00010001	The program-control-which-does-not-change-bit step (ce) is OK.
00010010	The program-control-which-resets-bit step (cr) is OK.
00010011	The program -control-which-sets-bit step (cs) is OK.
00010100	The incremental-jump-on-equal step (ne) is OK.
00010101	The incremental-jump-on-not-equal step (nn) is OK.
00010110	The jumps are all tested with their link bits on and thus, the link operation is OK.
00010111	The accumulator has been exercised and found to be OK.
00011000	If a CR followed by a t followed by another CR is followed by the alignment sequence, the direct output to the translator and the multiplex output are working. The light is turned on by an indirect output to the lights



```
t
NANBNCNDNENFNGNHNINJNKNLNMNNNONPNQNRNSNTNUNVNWNXNYNZN

N!N†N+N$N%N/N&N*N(N)N–N@N¼N¾N½N'N'N:N

nanbncndnenfngnhninjnknlnmnnnonpnqnrnsntnunvnwnxnynzn

n1n2n3n4n5n6n7n8n9n0n;n=n]n¢n[n,n:n

n–n:n

NbNdNfNhNkNlNtN1N2N3N4N5N6N7N8N9N0N(N?N)N
```

EXPANDED MEMORY CHECKS

After the PSCP has progressed to the binary light display of 24, three additional depressions of the START key will check the following program steps which the expanded memory uses.

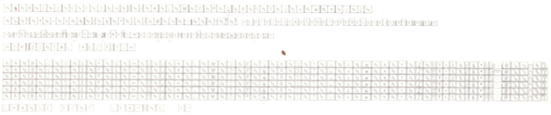
00011001	The prefix step is OK.
00111001	The prefix P operation failed.
01011001	The prefix Q operation failed.
01111001	The prefix P&Q operation failed.
00011010	The boundary jump operation is OK.
00111010	One of the boundary jump operations failed.
00011011	The output to the Third Tape is OK.

After the third additional depression of the START key, the typeout will transfer to the Third Tape Recorder in LOWER CASE. (There MUST be a tape loaded on the Third Tape Recorder.) Playout of the third tape will then show if the transfer process functioned properly. (This tape MUST be played out in Flush Left Mode.)

```
256 LOADED!
DIAGNOSTIC TAPE CONTENTS — RIGHT TAPE

ALIGNMENT — REFERENCE 1

ALIGNMENT CHECKS
VERTICAL - MARGIN 0 - INSTALL GAGE FONT - YELLOW PITCH - LEADING 6
```



```
UNIT BACKSPACE

HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
MANUALLY CHECK CHARACTER BACKSPACE

CARRIER RETURN
CHECK FOR FREE SYSTEM—BLUE PITCH—BLOCK HOMING PAWL LATCH
wm
wm
wm
wm
wm
MARGIN AT 0—RED PITCH
m
mm
mmw
mmwwo
mmwwommww
mmwwommwwoommwwoommwwoo
mmwwommwwoommwwoommwwoommwwoommwwoommwwoo
mmwwommwwoommwwoommwwoommwwoommwwoommwwoommwwoommwwoo
SET MARGIN TO 10

                    m
                    mm
                    mmwwo
                    mmwwommww
                    mmwwommwwoommwwoommwwoo
                    mmwwommwwoommwwoommwwoommwwoommwwoommwwoo
                    MANUALLY HOLD LH MARGIN RACK---CHECK CR UNLATCHING

                    SET MARGIN TO 0
                    Insert another sheet of paper

CYCLE CLUTCH — REFERENCE 2

CYCLE CLUTCH CHECK
APPLY LIGHT LOAD ON THE PRINT SHAFT- CAUTION— DO NOT USE YOUR HANDS

888888888888
MANUALLY CHECK SPACEBAR OPERATION FOR EXTRA CYCLES

BACK UP THE PRINT SHAFT-DOES THE CC BUZZ

ESCAPEMENT
USE BLUE PITCH-BLOCK HOMING PAWL LATCH

wm
wm
wm
wm
wm
MATCH PITCH TO FONT
aAbBcCdDeEfFgGhHiIjJkKlLmMnNoOpPqQrRsStTuUvVwWxXyYzZ1!2†3+4$5%6/7&8*9(0)-—=@] ¼ [½?¾;:.',']
aAbBcCdDeEfFgGhHiIjJkKlLmMnNoOpPqQrRsStTuUvVwWxXyYzZ1!2†3+4$5%6/7&8*9(0)-—=@] ¼ [½?¾;:.',']
aAbBcCdDeEfFgGhHiIjJkKlLmMnNoOpPqQrRsStTuUvVwWxXyYzZ1!2†3+4$5%6/7&8*9(0)-—=@] ¼ [½?¾;:.',']
aAbBcCdDeEfFgGhHiIjJkKlLmMnNoOpPqQrRsStTuUvVwWxXyYzZ1!2†3+4$5%6/7&8*9(0)-—=@] ¼ [½?¾;:.',']
MANUALLY CHECK PITCH CHANGER MECHANISM


REPEAT SPACEBAR USING ALL VALUES(U/C & L/C)—CHECK STROBE EFFECT OF PINWHEEL
OBSERVE STROBE EFFECT OF PINWHEEL ON THE FOLLOWING REPEAT CHARACTERS

mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm]
wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww]
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE;]
ddddddddddddddddddddddddddddddddddddddddddddddddddddddddddd]
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz]
tttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttttt]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;]

INDEX CHECK
SET LEADING TO 5

x
x
x
x
x
INDEX CHECK FOR ALL INDEX VALUES
REMOVE THE PAPER AND MARK THE INDEX RATCHETS BEGIN AT LEADING 5
DEPRESS SEARCH TO BYPASS THIS CHECK

(Test consists of a series of carrier returns  designed to check indexing.)
Test No. 1 — 66 Carrier Returns  — Leading 5
Test No. 2 — 66 Carrier Returns  — Leading 6
Test No. 3 — 66 Carrier Returns  — Leading 7
Test No. 4 — 66 Carrier Returns  — Leading 8
Test No. 5 — 66 Carrier Returns  — Leading 9
Test No. 6 — 33 Carrier Returns  — Leading 10
Test No. 7 — 66 Carrier Returns  — Leading 11
Test No. 8 — 33 Carrier Returns  — Leading 12
Test No. 9 — 66 Carrier Returns  — Leading 13
Test No.10— 66 Carrier Returns  — Leading 14
Test No.11— 22 Carrier Returns  — Leading 15
Test No.12— 66 Carrier Returns  — Leading 16
Test No.13— 66 Carrier Returns  — Leading 17
Test No.14— 33 Carrier Returns  — Leading 18
Test No.15— 66 Carrier Returns  — Leading 19
Test No.16— 33 Carrier Returns  — Leading 20
```

```
INTERLOCKS — REFERENCE  3


SET LEADING TO FONT BEING USED

INTERLOCKS
CHECK MANUALLY

JUSTIFIER
CHECK MANUALLY

KEYBOARD
aaaaabbbbbcccccdddddeeeeefffffggggghhhhhiiiiijjjjjkkkkklllllmmmmmnnnnne]
ooooopppppqqqqqrrrrrssssstttttuuuuuvvvvvwwwwwxxxxxyyyyyzzzzz11111e]
2222233333444445555566666777778888899999000000--==]][[????;;;;....,,,,e]
1=q[a]2;z-w?sp3.x0eldo4,c9rkfi5mv8tjgu6nb7yhhy7bn6ugjt8vm5ifkr9c,4odr]
                                                 le0x.3ps?w-z;2]a[q=1r]


PAPER FEED – REFERENCE 4

PAPER FEED
SET LEADING AT 20-USE LARGE FONT–STICK POSITION 1
                                                                zzz
zz --------------------------------------------------------------
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
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zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
zzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzzz
ROLL BACK –LINE UP FIRST ROW OF M DASHES  –– (Type "z" as shown – Stick shift to 5)
CUT THIS PAGE TO CHECK LINE-TO-LINE VARIATION

CHANGE LEADING TO 12 – INSERT ANOTHER SHEET OF PAPER


PRINT AND RIBBON
CHECK RIBBON FEED

,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
OPERATE THE SPACEBAR–DOES THE RIBBON FEED

USE SMALL TYPESTYLE- CHECK FOR EMBOSSING

ABCDEFGHIJKLMNOPQRSTUVWXYZ!†+$%/&*()–@¼½¾:"
abcdefghijklmnopqrstuvwxyz1234567890-=][?;,,,,,,,,,,,,,,,,,,,,
USE LARGE TYPESTYLE- CHECK FOR COVERAGE

ABCDEFGHIJKLMNOPQRSTUVWXYZ!†+$%/&*()–@¼½¾:"
abcdefghijklmnopqrstuvwxyz1234567890-=][;?.,MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM

SHIFT
AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz!1†2+3$4%5/6&7*8(9)0–-@=¼]½[¾?:;'.',
MAKE MANUAL CHECKS


TABULATION – REFERENCE 5


TAB
SHORT TABS –SET 6 TAB STOPS ACROSS WRITING LINE-SET PITCH TO RED- DEPRESS TAB LOCATE
START TAPE

PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI
PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI PI
LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI
LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI   LI
NORMAL TABS–RESTORE TAB LOCATE
|           |           |           |           |           |
|           |           |           |           |           |
|           |           |           |           |           |
|           |           |           |           |           |
|           |           |           |           |           |
|           |           |           |           |           |
MANUALLY CHECK TAB BRAKE

THIS COMPLETES THE COMPOSER CHECKS
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MERGE TEST – REF. 6

PRIOR TO RUNNING THIS TEST LOAD APPLICABLE PRECON TAPE. THEN LOAD BOTH DIAGNOSTIC TAPES, SEARCH TO REF. 6. ENTER CLEAR YES – MERGE YES – TAPE/START.

256 LOADED!

MERGE TEST: IN THE FOLLOWING MERGE TEST THE OUTPUT LINES SHOULD ALTERNATE FROM EACH STATION IF THE OPERATION IS CORRECT THE TEST SHOULD END WITH LINE G-L.

THIS IS MERGE LINE A FROM STATION R.
THIS IS MERGE LINE A FROM STATION L.
THIS IS MERGE LINE B FROM STATION R.
THIS IS MERGE LINE B FROM STATION L.
THIS IS MERGE LINE C FROM STATION R.
THIS IS MERGE LINE C FROM STATION L.
THIS IS MERGE LINE D FROM STATION R.
THIS IS MERGE LINE D FROM STATION L.
THIS IS MERGE LINE E FROM STATION R.
THIS IS MERGE LINE E FROM STATION L.
THIS IS MERGE LINE F FROM STATION R.
THIS IS MERGE LINE F FROM STATION L.
THIS IS MERGE LINE G FROM STATION R.
THIS IS MERGE LINE G FROM STATION L.

GENERAL TEST – REFERENCE 7

PRIOR TO RUNNING THIS TEST LOAD PRECON 256. PAPER AT 0, TAB AT 16. CLEAR YES – MERGE NO – MODE J – LINE COUNT 1000 – MEASURE 432 – LINE INDENT NO – PARA INDENT NO – LEADER 3 – MIN IW 3 – MAX IW 12 – MAX QUAD 20 – LINE EXP (MIN HYP) YES – DEAD KEY NO.

256 LOADED!

GENERAL TEST

At the beginning of this tape a Prefix Code (same character configuration as an MT/ST Stop Code) was recorded followed by the letter "L" This instruction tells the MT/SC to run in a "flush left" mode.

We are now justifying copy on a line length of 240 units. You will notice that the line endings do not correspond to the original hard copy but are determined by the number of character values it takes to make up a 240 unit line including spaces.

Interletter spacing will immediately occur with the reduced measure. This is basically a newspaper column measure. It is apparent that the typographic quality is definitely reduced because justification is more difficult to accomplish as we work with fewer spaces on each line.

Key a Min Hyphen. "NO" decision. This instructs the console to try to justify the line by first using the minimum and maximum interword limits. If justification cannot be done within these limits, the next choice will be to hyphenate. The MT/SC makes this choice for us. It will tab to the right side of our copy and print out the word in the next line that should be hyphenated and print a closed paren to indicate that the word should be broken somewhere to the left of the paren. The operator then depresses the HYPHEN button and the START button. The MT/SC will/print/out/the/next/ line and place the hyphen where the operator indicated.

WITH)IN WITH–

HYPHENA)TED HYPHEN–

WILL/PRINT/OUT/THE/NEXT/LI)NE WILL/PRINT/OUT/THE/NEXT/

This is called a "Flush right" mode of
operation. The line measure (length) is
300 units but we are spacing in from the left
hand margin as many units as are necessary to
print the line with even right hand margins.
You may recall that during the original setup
we answered the keyboard question "Leader
space" by keying in a "3". We were telling
the machine to leave 3 units of space between
any leader dots which were to be printed.

. . . . We are now leadering with dots preceeding the
. . . . .printed copy. The "D" which we recorded
. . . . .causes the MT/SC to in effect justify the line
. . . . by filling the space between the left hand
. . . . margin and the printer copy with dots. These
. . . . dots are evenly spaced 3 units apart.

Now we are centering the recorded text line
for line as recorded. It is being centered
within the limits of our 300 unit measure.
Of course centering looks much better if
shorter sentences are recorded like this:
The Magnetic Tape
"Selectric" Composer
is a product of
IBM

† † † END OF GENERAL TEST † † †

260 TEST – REFERENCE 8

PRIOR TO RUNNING THIS TEST LOAD PRECON 260. LOAD DIAGNOSTIC TAPE AND SEARCH TO REF. 8. ENTER CLEAR YES – TAPE/START AND FOLLOW INSTRUCTIONS.

260 LOADED!

PRECON 260 TEST-----CLEAR–yes MERGE–no MODE–j LINE COUNT–1000 MEASURE–500 LINE INDENT–no PARAGRAPH INDENT–25 LEADER SPACE–6 MIN IW–3 MAX IW–9 MAX QUAD–12 MIN HYPHEN.–yes DEAD KEY–no.

The Precon 260 tape changes the internal conditions of the MT/SC so that the marking and recording of indented projects is as simple as that for the five basic Modes.

I. The line length capacity of Precon 260 is approximately 624 units in comparison to the approximately 816 units maximum Measure for Precon 256.

    A. The Outline Code (Prefix Code–O) has characteristics similar to the Justify Code.

    B. All text following an Outline Code is justified; however the levels of indention at the left margin are established by one or more recorded tabs.

II. Like the Justify Code, an "O" Code must be recorded at the beginning of a field. Following an "O" Code, paragraphs or fields are identified by multiple Carrier Returns or by a Carrier Return/"O" Code combination. As you will see, a Carrier Return/Tab combination has a different function in the Outline Arrangement; therefore, it cannot be used for paragraph identification in the "O" Arrangement.

    A. The Outline Code remains in effect until one of the five basic Mode Codes is read from the tape or entered at the Control Panel.

III. The recorded Outline Code indicates to the MT/SC that all line indentions following will be established by a number of recorded tabs. Each recorded tab will indent the number of units entered as the Paragraph Indent Value.

    A. A Line Indent entry at the Control Panel or a recorded Indent Code must not be used in the Outline Arrangement. Either of these will generally be ignored by the Output Unit; however, under certain circumstances they may cause errors in the output copy.

    B. Since the indent values on the output copy are the result of tabs equal to the Paragraph Indent value, each indent level is equal to a multiple of the Paragraph Indent Value.

    C. The Paragraph Indent Value must be larger than the unit value of the longest identification character.

    D. The measure value selected represents the total line length from the left Margin set to the right hand margin.

IV. Once the Measure for the project has been determined, you are ready to mark the copy.

    A. Mark an Outline Code at the beginning of the first line to be affected. The Measure may be marked for recording or entered at the Control Panel.

    B. After the paragraph identification character, mark a tab symbol. This tab sets the indent level for the first line.

    C. Mark the remainder of the paragraph to indicate that a tab is to precede each recorded line. When the MT/SC reads a Carrier return the indent is cancelled; therefore, the tab beginning each line is necessary to re-establish the indent for that line.

V. When copy in the Justify Mode follows copy in the Outline Arrangement, if the paragraphs are not to be indented, no "J" Code is necessary. Each line is recorded beginning at the left margin.

    A. If the justified paragraphs are indented on the first line, a "J" code must precede the recorded tab that will convert to the Paragraph Indent.

    B. If the "J" Code is omitted in this case, a recorded tab will set up an indent level that affects each output line containing any word recorded on the first input line of the text to be justified.

END OF PRECON 260 TEST

261 TEST – REFERENCE 9

PRIOR TO RUNNING THIS TEST LOAD PRECON 261. LOAD DIAGNOSTIC TAPE AND SEARCH TO REF. 9. ENTER CLEAR YES – TAPE/START AND FOLLOW INSTRUCTIONS.

261 LOADED!

PRECON 261 TEST––––CLEAR–yes MERGE–no MODE–j LINE COUNT–1000 MEASURE–350 LINE INDENT–no PARA INDENT–25 LEADER SPACE–6 MIN IW–3 MAX IW–9 MAX QUAD–12 MIN HYPHEN.–yes DEAD KEY–no.

THE FOLLOWING SUMMARY OF PRECON 261 PROVIDES A QUICK REFERENCE GUIDE.

1. Maximum line length when using the five basic Mode Codes is 384 units.
2. The maximum measure for each Mode/Measure pair is 255 units.
3. The Mode/Measure pair capacity for a single "T" line is 20.
4. A prefix code must precede the "T" ONLY.
5. The mode in a Mode/Measure pair must be a nonjustify Mode.
6. A flush left in a Mode/Measure pair requires a measure.
7. Each pair ends with a comma, The last pair has two commas; one to end the pair and one to end the "T" line.
8. When white space is set up as a separate column, it has its own Mode/Measure pair in the "T" line.
9. Only a "J" Code will change the output from a "T" line operation. A "L", "R", or "C" will be treated as an exception line, and hold for one line only.
10. A "T" line is held in memory until another is read from the tape. A stored "T" line can be recalled from memory for setting up another table by recording a Prefix Code-T-Comma.

The following test used the "T" Line. If the machine will run this table correctly, any project which is recorded correctly should run correctly.

REFERENCE 10

MT/SC PRECON TAPES
MAXIMUM MEASURE AND OVERFLOW POINTS

Precon	Maximum Characters	Approximate Maximum Measure	Approximate Overflow Point
256	170	816 Units	748 Units
259	154	739 Units	624 Units
260	130	624 Units	499 Units
261	80	384 Units	326 Units

PRECON 261 "T" TABLE When using the "T" Table the maximum measure for a Mode/Measure pair is 255 Units, with a maximum of 20 Mode/Measure pairs.

END OF PRECON 261 TEST

259 TEST – REFERENCE 11

PRIOR TO RUNNING THIS TEST LOAD PRECON 259. LOAD DIAGNOSTIC TAPE AND SEARCH TO REF. 11. ENTER CLEAR YES – TAPE/START AND FOLLOW INSTRUCTIONS.

259 LOADED!

PRECON 259 TEST––––CLEAR–yes MERGE–no MODE–on tape LINE COUNT–1000 MEASURE–on tape LINE INDENT–no PARAGRAPH INDENT–25 LEADER SPACE–6 MIN, IW–3 MAX IW–9 MAX QUAD–12 MIN HYPHEN.–yes DEAD KEY–no.

To record a Horizontal Rule Code, the recording operator records a Prefix Code and an "h". When this code is read at the output unit, a series of 8-unit dashes will print. It is possible to produce a horizontal rule with any Composer Type Font, however, with Composer Fonts other than Century or Classified News type styles, white space will appear between the 8-unit dashes. ––––––––––

The Horizontal Rule Code must be recorded on the tape. It cannot be entered at the control panel. ––––––––––––––––––––

Recording for the Horizontal Rule is almost the same as recording for the Dot Leader. The Horizontal Rule Code may be recorded in the same positions as the Dot Leader Code, however the Horizontal Rule Code must be recorded on each line to be affected. This is the basic difference between recording for the "h" and "d" codes. The Horizontal Rule Code may be recorded to produce output copy with a series of 8-unit dashes at the end of a Justified paragraph. ––

ON A LINE BY ITSELF.

––––––––––––––––––––––––––––––––––––––

–––––––––––––––––– AT THE BEGINNING OF A LINE.

AT THE END OF A LINE.–––––––––––––––––––––––

IN THE MIDDLE OF A LINE.

256 –––––––––––––––––––––––––––––––––BASIC
259 ––––––––––––––––––––––– HORIZONTAL RULE
260 –––––––––––––––––––––––––––––– OUTLINE
261 –––––––––––––––––––––––––––––– TABULAR

END OF PRECON 259 TEST.